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Psychological effects of physical exercise and Yoga.

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PSYCHOLOGICAL EFFECTS OF PHYSICAL EXERCISE AND YOGA

A Dissertation Presented

by

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ABSTRACT

PSYCHOLOGICAL EFFECTS OF PHYSICAL EXERCISE AND YOGA

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Popular biological and psychological theories strongly advocate that regular physical exercise brings about long-term and short-term psychological benefits. Similarly, Yoga tenets promise to generate significant improvements in psychological and physical health. However, considerate controversy exists, as rigorously designed experimental studies have consistently challenged the existence of a causal connection between physical activity and psychological changes. The current project was undertaken to test the hypothesis that physical activity moderates the students' experience of stress during an academic semester. The project suggested that psychological changes may take place as the students undergo changes in their physical self-concept. First, a quasi-experimental study assessed 97 students at a large state university, who either attended traditional physical education (PE) courses, enrolled in Yoga courses or abstained from physical activity. The students filled out self-report measures, at the beginning and the end of an academic semester. The results have showed that, at the beginning, all groups were similar in their psychological presentation but different in their attitude. The data

obtained at the end of the semester suggested that, overall, the students' well-being did not change. However, contrast analyses showed that the Yoga students became more distressed than the exercise students, and that exercise students faired better than the control group. Also, the changes in psychological symptoms were significantly related to the changes in physical self-concept. Second, twenty structured interviews were conducted with the Yoga and exercise students. Qualitative analysis provided systematic description of the two groups, specifically of their motivation, stress, self-concept and the perceived effectiveness of their PE course. The results suggested that all students evaluated their PE courses as highly effective and beneficial. The statistical data has also supported a graphic model that connected the students' expectations, experience of stress and changes in self-concept. This model has shown that such connections are complex, and not direct one-to-one relationships. In conclusion, the project supported the hypothesis that physical activity brings about positive psychological benefits by promoting a change in physical self-concept. It showed strong similarities in the subjective experience of the Yoga and exercise students. The implications of such findings for clinical practice were discussed.

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CHAPTER I

INTRODUCTION

A wide body of popular and professional literature supports the view that regular physical activity is beneficial both physically and psychologically (see a review by Kirkcaldy & Shephard, 1990). Relying on such numerous studies, the International Society of Sports Psychology (ISSP) has issued a position statement advocating that "the process of exercise brings about short and long term psychological enhancement and well-being" (ISSP, 1992, p. 86). Their opinion asserts that exercise may alleviate anxiety and mild to moderate depression, and that it "can have beneficial emotional effects across all ages and for both sexes" (ISSP, 1992, p. 89). As a group, the society makes an emphatic statement: "The ISSP encourages all people to participate in free-choice vigorous physical activity on a regular basis" (ISSP, 1992, p. 88). However, other researchers caution against drawing exaggerated inferences about the benefits of exercise from the available data (for example, Berger & Owen, 1992; Emery & Blumenthal, 1991; Gauvin, 1989). In their review of empirical data, Leith and Taylor (1990) question the existence of a direct relationship between exercise and mental health.

In contrast to the Western forms of physical exercise, the practice of Yoga has been explicitly designed to improve both physical and psychological health (Jain, Rai, Valecha, Jha, Bhatnagar & Ram, 1991). The original Yoga teachings, "Yoga Sutras," written in the third century BC, contain specific guidelines for all spheres of functioning:

physical, psychological and interpersonal (Ramaswami, 1989). These writings explicitly promise that, by following the guidelines, an individual becomes healthy in both the body and the spirit.

Considering the controversy in the outcome of research which examines the relationship between physical activity and emotional well-being, it seems necessary to further examine this topic area. It might also be useful to compare the effects of a Western exercise routine, such as aerobics or weight training, to the practice of Yoga.

A. Existing Research on the Psychological Effects of Physical Exercise

In their literature review, Kirkcaldy and Shephard (1990) examine the connection between physical exercise and psychological well-being. They argue that an exercise program may even have "certain advantages. . . over potential alternative forms of therapy" (p. 165). These advantages include a self-reinforcing quality of the exercise routine. In contrast to medical procedures, clients typically feel rewarded by the process of engaging in exercise. Also, an exercise routine typically requires only an initial involvement by professional staff. Once clients are familiar with the procedure, they may follow the exercise routine independently.

Kirkcaldy and Shephard (1990) cite a number of theories which may explain the positive benefits of physical exercise, from biological and psychological perspectives. First, physical activity stimulates "an increased secretion of mood-altering neuro-transmitters enkephalin and the beta-endorphins " (p. 169). Such chemicals are known as

endogenous opiates. Research has shown that these chemicals are secreted during aerobic exercise, such as long-distance running. Second, regular exercise may change an individual's biological reaction to stress. Once people engage in a regular exercise program, their subjective experience of stress may manifest differently on a physical level. Medical theory attributes such changes to the change in the number and sensitivity of adrenaline receptors. Third, from a psychological perspective, a regular exercise routine positively affects a person's self-concept. For example, increased physical fitness leads to a perception of "control of the immediate environment" (p. 170). Therefore, the authors suggest a positive relationship between physical exercise and the perception of self-efficacy. Kirkcaldy and Shephard (1990) also argue that the development of a socially "appropriate" body image positively affects a person's mood state. For instance, they cite a study which maintains that "physically strong individuals [are] more satisfied with their bodies" (p. 171). Finally, a regular exercise routine may provide opportunities for engaging in a greater number of social contacts and participating in group activities.

However, a well-designed experiment, conducted in Berlin, Germany, challenged the existing theoretical explanations of the effectiveness of physical exercise (Otto, 1990). The author randomly assigned 80 female subjects to four experimental conditions. All of the subjects were placed in a stressful situation when the researcher explained that the study required presenting a twenty-minute speech in front of a TV camera. Half of all subjects were asked to ride an exercise bicycle for two five-minute intervals while waiting; half of them were given an opportunity to prepare by drawing an outline of the speech; half of them were placed in an additional mood induction by being given

intentionally lowered IQ scores. The author hypothesized that, if the exercise operated according to the general drive theory, the general activation of the organism would also enhance the emotional experience. On the contrary, the study showed that exercise significantly lowered the subjects' scores on an adjective check-list measuring current mood states, such as self-reliance or anxiety. In addition, the results suggested that intentionally focusing on the approaching event raised the subjects' negative mood scores and, also, increased their pulse rate. Therefore, the author hypothesized that the positive benefits of the exercise in managing a stressful situation may not be induced through the biological mechanism, but through the process of cognitive re-focusing and distraction.

Another recent experiment further challenged the biological or psychological explanations of the exercise effectiveness. That study tested "the provocative hypothesis that exercise enhances psychological well-being via a strong placebo effect" (Desharnais, Jobin, Cote, Levesque & Godin, 1993, p. 149). The authors randomly assigned 48 subjects to two experimental conditions. All subjects engaged in the same training program that lasted for ten weeks, three times per week, and included warm-up exercises, group aerobic activities and cool-down time. In addition, subjects in one group were put through the "expectancy manipulation procedure." They were informed that the training program was designed to improve their well-being, and they were reminded about this objective throughout the program. The results indicated that the subjects who expected to benefit psychologically scored progressively higher on their self-esteem scores, measured on the Rosenberg Self-Esteem Scale. The authors then argued that, although other explanations cannot be ruled out, the placebo effect must also be present in the

"beneficial influence of exercise" (p. 153). Interestingly, in supporting the presence of placebo, Desharnais et al. argued against the negative connotations of that concept. They pointed out that this mechanism is present in all psychological interventions, and that it may be considered "a powerful psychological mechanism in itself" (p. 149).

In addition to challenging the theoretical explanations of the effectiveness of exercise, researchers also caution against drawing exaggerated inferences from the available data. For example, Gauvin (1989) warns about "recent marketing trends in the fitness and lifestyle promotion" that may skew the interpretation of the results (p. 108). Gauvin believes that a person's psychological well-being depends on the ability to satisfy everyday goals, "personal strivings ." She advocates that "active and inactive subjects probably have a different set of personal strivings " (p. 110). The author suggested that a person's mood state may be related a fulfillment of such personal strivings, more than to an engagement in an exercise program. The author tested her hypothesis with a study which included 122 adults, aged from 18 to 77, who were enrolled in fitness, language and art classes at a YMCA. The subjects responded to questionnaires which assessed the frequency of their positive and negative affect. The data showed that subjects in all groups reported feeling positively and negatively at approximately the same frequency. These results were unable to prove that physical exercise raised the subjects' mood significantly more effectively than other forms of creative activity. Reviewing these analyses, Gauvin (1989) emphasizes that "caution must be taken in publicizing and disseminating the positive effects that exercise may have on mental health" (p. 113).

Two additional studies question the existence of a direct relationship between exercise and mental health. For example, Emery and Blumenthal (1991) have reviewed literature on the effects of exercise on older adults' cognitive functioning. They conclude that older people may "perceive significant changes in cognition and affect following regular exercise even without physiological evidence of that change" (p. 99). In another study, assessing the psychological state of young swimmers, Berger and Owen (1992) note that their subjects' mood changed under different weather conditions. They conclude that "the relationship between exercise and mood alteration seems to be more fragile than previously expressed. . . The psychological benefits of exercise are not unconditional" (p. 1332).

Gleser and Mendelberg (1990) conducted a review to clarify the relationship between exercise and specific clinical problems, such as anxiety, depression and low self-esteem. They recommended physical exercise as a practical approach for managing moderate levels of symptoms. However, like the previous authors, they repeatedly used language such as "contradictory results" and "cautious reports" to warn against overly optimistic interpretation of the existing research (pp. 100-102). Gleser and Mendelberg criticized the methodology in most studies on physical exercise in the clinical population. They noted that the use of such terms as "depression" was rarely supported by standard diagnostic criteria. Also, most studies used non-experimental design, selected subjects who had already volunteered for the activity and, therefore, were unable to control for the placebo effect. The authors concluded that the existing research was unable to prove a causal relationship between the exercise and a reduction in clinical symptoms.

Similarly, Leith and Taylor (1990), who conducted a thorough review of empirical studies on the effects of exercise, pointed out an inherent limitation of using physical activity as a therapeutic tool. They argued that "the expectation that exercise as a single intervention technique could modify an individual's relatively stable personality traits appears somewhat grandiose" (p. 220). The authors cited the results of their meta-analysis of 81 studies. They divided all the studies into three categories, according to methodology: "pre-experimental," "quasi-experimental" and "experimental." They noted that 70% of the selected studies reported an improvement in psychological well-being, 80% reported some psychological benefits, and only 19% reported no change. However, they have also found "less support for the positive psychological effects of exercise in the experimental category than in the pre-experimental and quasi-experimental studies" (p. 230). The authors conclude that "more studies of this nature are needed before we can make causal inferences regarding the relationship between exercise and psychological well-being" (p. 230).

In addition, another significant drawback exists in this research area. Leith and Taylor (1990) noted in their review that most studies assessed the subjects' overall well-being, and not a specific psychological difficulty or clinical diagnosis. Most studies in their review assessed psychological well-being by such data as the total scores of the Tennessee Self-Concept Scale (Ben-Schlomo & Short, 1986; Hilyer & Mitchell, 1979; Plummer & Koh , 1987; Tucker, 1983) and General Well-Being Scale (Cramer, Nieman & Lee, 1991; Tucker & Maxwell, 1992). The authors argued that "no attempt

has been made to correlate the nature of physical activity or exercise with a particular psychological construct" (p. 231).

Besides the studies quoted in that review, other published articles cite measures that have not been validated. For example, one work offered a conclusion that "exercise promotes well-being of older adults" (McPhillips, Pellettera, Barrett-Connor, Wingard & Criqui, 1989, p. 65). The assessment of the subjects' well-being was based on the answers to such questions as, "Compared to others your own age, how would you rate your health?" The researchers then analyzed the data, by dividing the subjects into two groups based on their responses to this question as "better/same" or "worse." First, such methodology reduced the wide continuum of well-being to two subjectively selected categories. Second, it ignored such components of well-being as self-efficacy, body image and social interaction, which previous research noted as significant (Kirkcaldy & Shephard, 1990).

Similarly, a dissertation study by Eckstein (1990) illustrates the problem of over-generalizing the psychological benefits of exercise. The author selected two groups of Hawaiian residents. One group consisted of 32 men and women who were already enrolled in a six-week intensive residential aerobic fitness program. These subjects attended daily classes in a variety of disciplines, including aerobics, weight training, Yoga and Gestalt dance movement. The other group consisted of 32 men and women who were enrolled in local aerobic classes, but did not participate in a similar residential program. The groups were matched on such variables as age, marital status and education. The subjects were assessed at the beginning and the end of the six-week

period, using two self-report scales, the California Personality Inventory (CPI) and the Personality Orientation Inventory (POI). Not surprising, the author found greater changes in the group of subjects who attended intensive residential training, as opposed to the subjects who continued their regular aerobic classes. Based on these data, the author concluded that "the present study seems to verify ancient principles of health from Greece, India and Japan" (p. 119).

This dissertation study contains severe methodology problems. First, the author reported no efforts to control for such variables as the subjects' initial mental state or their level of physical fitness. Second, the study did not control for the effect of expectations that the subjects had of their activity. It is likely that the people who attended a six-week mind-body residential program in Hawaii were interested as much in their physical fitness as in improving their psychological well-being. After investing a significant amount of time and money on that endeavor, they were probably more likely to make positive statements on the self-report scales employed by the study. In contrast, the author did not report the degree of emphasis on the subjects' psychological state that was conveyed by the instructors of the aerobics group. Third, the subject groups were not equivalent on a number of crucial variables, such as the amount of attention from the trainers, or the length of time that the spent each day exercising. Finally, the author makes broad conclusions which would apply to all populations, under all circumstances. The conclusions ignore the limitations that are contained within such exploratory studies, based on selected and small groups of subjects.

Such problems in research methodology were noted by two meta-analytical studies, which focused on the connection between exercise, anxiety and depression. In their review of the relationship between exercise and anxiety, Kerr and Vlaswinkel (1990) stated that "a large number of the reported investigations were beset by methodological problems" (p. 314). Similarly, Matrinsen (1987) conducted a meta-analysis of the connection between exercise and depression. The author searched major medical databases of studies in English, from 1980 to 1986. Previous studies were included in the meta-analysis only if they satisfied three requirements: conducting clinical diagnosis of the patients, using standard assessment techniques and ensuring the presence of a control group. Only nine relevant studies were found, two of which had not yet been published. Nevertheless, despite these methodological drawbacks, the authors of both reviews tentatively suggested that the data pointed toward positive effects of exercise on both anxiety and depression.

Finally, Agnew and Levin (1986) questioned the applicability of such research to the experience of an average person engaged in exercise. Focusing on the benefits of running, they joined the previous studies in questioning "the euphoria surrounding the running boom" and the "sparse, somewhat contradictory" research data (pp. 14-15). Agnew and Levin analyzed the data from the survey of 3,025 US residents conducted by the National Center for Health Statistics in 1979 and, then, followed-up one year later. The authors assessed mood and perceived health by responses to such questions as "All in all how happy are you these days?" and "In general, how satisfied are you with your overall physical condition?" During the survey, the respondents were asked to rate these

questions on a seven-point Likert scale. The respondents also stated how often they ran, and the number of miles that they ran each week. Cross-sectional regression analysis confirmed that runners scored significantly higher in mood and perceived health. However, longitudinal regression only showed the effect of running on health, and the effect size was small. The difference between cross-sectional and longitudinal data may suggest that people who already feel better psychologically are able to engage in physical exercise. In contrast, a long-term engagement in an exercise program may not produce a change in the psychological state. Further, the authors criticized the applicability of experimental studies to the experience of the global population. They argued that "experimental studies. . . bear little similarity to exercise patterns in the real world" and that it would be dangerous to "generalize experimental data to the larger society" (pp. 24-25). The authors pointed out, for example, that people who actively abuse alcohol or experience clinical depression would rarely sustain an on-going exercise program.

In conclusion, research provides broad support for the positive psychological benefits of physical activity. By engaging in a regular physical activity, people tend to feel better overall, both physically and psychologically. However, the reasons for such positive benefits remains unknown. Well designed studies were unable to provide evidence for a direct link between physical exercise and a specific psychological change, such as an improvement in depression, anxiety or self-esteem.

B. Review of Psychological Studies of Yoga

The word "Yoga" derives its origin from the Sanskrit root " yuj ," meaning "to yoke or bind" (Ramaswami, 1989). Commonly, this Sanskrit name is interpreted as the bringing together of "the powers of body, mind and soul" (Ramaswami, 1989, p. 34), a "union or communion. . . a poise of the soul which enables [one] to look at life in all its aspects evenly" (Iyengar, 1979, p. 19). Yogic philosophy claims the ability of transporting an individual into the state of perfect psychological and physical peace.

The original Yoga teachings, "Yoga Sutras," written in the third century BC, contain specific guidelines for all spheres of functioning: physical, psychological and interpersonal. These sutras contain instructions on breathing techniques, physical exercise and meditation. As a result of following these guidelines, an individual is trained to assume a different attitude toward the self and learns to feel "a part of a larger whole and, at the same time, whole self" (Kabat-Zinn, 1993, p. 136). This discipline teaches a holistic approach to mind and body, radically different from the Western mind-body dualism.

In the West, yogic philosophy is popularized largely through the practice of Hatha Yoga. The word "Hatha" translates from the Sanskrit as "force," and this discipline involves physical exercise of varying intensity (Ramaswami, 1989). A Hatha Yoga student learns to follow a series of postures ("assanas") that require physical strength, balance and flexibility. Typically, a Hatha Yoga class begins with a brief meditation or relaxation, followed by increasingly vigorous postures. These movements follow a

logical sequence, called "the flow," in which one series of exercise is "counter-balanced" with another. For example, a series of back arches, known as "the cobra," is commonly followed with forward bends. The flow of movements typically becomes less vigorous toward the end of the class and culminates with a relaxation assana ("shavassana" or "the corpse pose"). Although variations exist among different disciplines -- such as Iyengar, Kundilini, Kripalu or Vivananda -- each approach incorporates a predictable number of "basic" postures and follows a similar routine.

The practice of Yoga differs from the practice of other popular Eastern disciplines, Transcendental Meditation (TM) or Zen Meditation. In his review of psychological studies of mediation, Delmonte (1985) distinguishes between "mindfulness" practices, such as Yoga, and "concentrative meditation." In the process of acquiring mindfulness, a person learns to "observe, describe and participate" in all aspects of internal stimuli: physical, cognitive and emotional (Linehan, 1993, p. 145). This process requires that a person "experience with awareness, in the moment, whatever is happening, rather than leaving a situation or trying to terminate an emotion" (p. 145). In contrast, concentrative meditation requires that a person focus all attention on a selected external object, such as a sound, candle frame, or the rhythm of breath. Delmonte (1985) cited previous studies with sound methodology which showed that the regular practice of TM or Zen meditation leads to a reduction in anxiety. The author suggested some theoretical explanations for this process. For example, "meditation may be conceptualized as a slow-paced systematic desensitization," or "a mantra may become a conditioned stimulus eliciting a conditional relaxation" (p. 92). The study concluded

that meditation is a "diverse process" incorporating insight, desensitization and suggestion (p. 99).

Unlike the effects of TM or Zen meditation, the psychological effects of Yoga have rarely been documented with scientific precision. Some studies have been published, advocating the application of Yoga by professionals, in both mental health and medicine. These authors emphasize insight and self-awareness (Nespor, 1991) and the sense of control over inner resources (Broota & Dhir, 1990; Nespor, 1989). Students of Yoga report an improved perception of themselves as a result of engaging in this practice (Cusumano & Robinson, 1992; Rani & Rao, 1992). The same students have also reported lower self-efficacy (Cusumano & Robinson, 1992), which he authors interpreted as an ability to perceive their physical capacities more realistically. One study has shown that undergraduate students in Yoga classes appear to "feel better about themselves" and feel more confident about solving "personal and/or physical problems" (Rudolph, 1981, p. 2039-A). Finally, another study maintains that Yoga classes increase the congruency between individuals' view of themselves and their image of an ideal self (Rani & Rao, 1992).

These authors also cite their positive experience in applying Yoga in the medical and mental health settings. For example, Nespor (1993) describes using Yoga with psychosomatic, schizophrenic, anxious and depressed patients and advocates applying these techniques for alcohol and drug abuse rehabilitation. Relaxation techniques based on Yoga have been applied to treating anxiety and depression (Broota & Dhir, 1990). Yogic techniques have been used in treating asthma, stress and cardiovascular disorders

and hypertension (Cusumano & Robinson, 1992; Jain et al., 1991). Yoga has been applied for problems with back pain and chronic pain (Nespor, 1989; 1991). Finally, Latha and Kaliappan (1992) have taught Yoga to migraine headache patients, who are known to benefit poorly from drug treatments.

However, as the next chapter will show, the studies in which Yoga has been examined have suffered from a number of methodological problems, such as small group sizes, poorly designed control conditions and the use of unvalidated scales. In addition, although some evidence exists that Yoga positively affects the overall self-concept, its effect on a person's physical self-concept deserves further examination. In general, contemporary research argues that the physical domain of the global self-concept deserves more intensive investigation (Fox & Corbin, 1989; Marsh, Richards, Johnson & Roche, 1994). Reviewing previous literature, Fox and Corbin (1989) suggest that the global self-concept is composed of a number of independent domains, which may be arranged hierarchically. For example, a person's global self-concept may be affected by four separate, independent and equally important domains, such as academic, social, emotional and physical. Marsh et al. (1994) support this view and argue that the physical self-concept is an influential and independent component of a person's global self-concept. According to the hierarchical view of self-concept, they suggest that the physical domain may be sub-divided into a number of independent components. For example, persons' physical self-concept may be influenced by their perception of themselves as active, attractive and well-coordinated.

One may hypothesize that, because Yoga is a mind-body discipline, its positive psychological effects may stem from a change in such a physical self-concept. For example, by adopting the holistic Eastern philosophy, a person may approach the process of self-evaluation with a different, less critical attitude. In addition, as a result of engaging in a regular physical activity, Yoga students may begin to view themselves as being more flexible or well-coordinated. Therefore, such changes in physical self-perception may result in a more positive overall self-concept. It seems reasonable to design a new study which would apply more rigorous methodology to the study of Yoga and include measures of psychological and physical self-concept.

C. Published Empirical Studies on the Effects of Yoga

Although few controlled studies have examined the effectiveness of Yoga (American Psychological Association, 1997), the following selection illustrates the direction of the research in this field.

Gouger (1977) conducted a study which measured the effectiveness of Hatha Yoga with a psychiatric outpatient population. The author attempted to investigate the changes in the patients' symptoms of anxiety, as well as their attitude toward their psychological and physical selves. 36 subjects were randomly assigned to three groups. One group received Hatha Yoga instructions, another group participated in discussions about relaxation, and the third group received neither intervention and served as a control. Using the subjects' reports on self-description questionnaires, Gouger concluded that both

Yoga and relaxation reduced anxiety. Also, the participants in Yoga classes reported a greater magnitude of change, and these evaluations were confirmed by the patients' therapists.

Although Gouger's conclusions confirm the reports from anecdotal clinical literature, their validity is limited because of several problems with methodology. First, the 12 subjects selected for the control group did not receive the same level of attention that was allotted to the relaxation and Hatha Yoga groups. In addition, unlike the standard instrument (STAI) used to evaluate the subjects' anxiety, the evaluation of their self-concept was conducted through a non-standardized questionnaire.

Another study, conducted by Harrigan in 1981, used undergraduate population to compare the efficacy of different components of Yoga. Twenty four subjects were randomly assigned to four groups. One group received instructions in diaphragmatic breathing, another group was trained in Yoga postures, the third group learned both the breathing exercises and the postures, and the final group only attended lectures on holistic health. The effects of the interventions were measured with standardized instruments, such as the State-Trait Anxiety Inventory (STAI), Mood Adjective Checklist, and Tennessee Self-Concept Scale. The results showed that the group which received instructions in both diaphragmatic breathing and postures showed improved mood and reduced anxiety. The teaching of postures alone appeared ineffective in improving the subjects' mood and decreasing their anxiety.

The study by Harrigan is interesting because it follows a sound and simple methodology and questions the results of some researchers who identify Yoga practice

with stretches and postures. However, its results are limited by its selection of "normal" undergraduate students as the subjects, and by the small number of subjects in each group. The study also fails to report whether the subjects were initially matched, and whether the author made an effort to create equivalent conditions.

In a more recent clinical study, researchers investigated the efficacy of a relaxation technique based on Yoga (Broota & Dhir, 1990). Thirty subjects were selected from an outpatient pool of the department of psychiatry at a local hospital in Delhi, India. Each of those subjects was diagnosed with depression, but received medication for less than a year and never underwent electro-convulsive therapy (ECT). The subjects were randomly assigned to three treatment conditions: Broota Relaxation Technique (based on Yoga), Jacobson's Progressive Relaxation Technique, and no-treatment. The treatments were administered in three sessions, conducted in three consecutive days, and the subjects were assessed with a check list designed by the researchers. The check list included symptoms of anxiety and depression from the DSM-III and ICD-9 diagnostic manuals. The results suggest that both interventions were effective in reducing depression. The subjects who underwent a relaxation training, either by the Broota or Jacobson technique, reported significantly fewer symptoms than the control group. Also, the subjects taught the Broota method showed a greater improvement than the subjects taught progressive relaxation technique, but that difference was not statistically significant.

The controlled approach of this study favorably distinguishes it from other clinical reports on the effectiveness of Yoga. However, its methodology could be further improved in a number of ways. First, the researchers could have employed a standardized

psychological scale. Second, the treatment could be extended for longer than three sessions. Finally, a number of independent investigators could re-administer the treatment, to avoid experimenter's bias (Broota is the creator of one of the relaxation techniques).

In a similar attempt at validating the effectiveness of Yoga in managing stress and tension, Latha and Kaliappan (1992) conducted a study with migraine patients. Twenty migraine and tension headache patients were selected from private clinics in Madras, India. The patients were randomly assigned to a "Yoga therapy" group, or remained in a control condition which received no additional intervention. The subjects in both groups continued seeing their own physicians. The study lasted for four months. The patients who received Yoga therapy met for 32 group sessions and practiced daily at home. At the beginning and the end of the study, the patients rated their headaches for frequency, duration and intensity. They also filled out a stress questionnaire, designed by the researchers and validated on 30 undergraduate subjects. The results indicated "effectiveness of yoga therapy in controlling the headache activity and also its superiority over normal drug therapy" (p. 44). In addition, the subjects' perception of stress was reduced, and they appeared to select more adaptive coping strategies. Specifically, the patients trained in Yoga resorted less to somatization as a means of coping with daily stresses.

This study reports important clinical findings, considering that migraine headache presents a challenge for traditional drug treatments. However, the authors conclusions reach beyond the scope of their methodology. Since their patients remained in the

traditional medical treatment as well as undergoing additional Yoga interventions, the authors could only conclude that the addition of Yoga to medicine was beneficial. Their claim of the "superiority" of Yoga seems unfounded. Second, as in some previous studies, the control group in the current project did not receive the same degree of attention and activity that the Yoga therapy group. Therefore, as the researchers acknowledge in the conclusion, it remains questionable whether the improvement is "due to the expectations" raised by the involvement in Yoga therapy (Latha & Kaliappan, 1992, p. 46).

Rani and Rao (1992) examined the effects of Yoga on the participants' self-concept. The authors argued that the self-concept is based upon a set of standards used to evaluate one's own performance as "good, bad, successful, unsuccessful, etc." (p. 36). Their study investigated whether Yoga narrows the disparity that people commonly report in their ratings of themselves and their ideal selves. The subjects included 36 students prepared to enroll in a Yoga training class in the Andhra University in India, and 37 students who completed the course. The subjects completed the Self-Ideal Disparity Scale, which assessed 17 personality traits. The subjects were asked "how they perceive themselves" and "how they would most like to be" (p. 37). The results showed that the group of subjects who underwent Yoga training rated their perceived selves closer to their ideal selves, than the subjects preparing to enroll in the course. Therefore, the authors concluded that "the post-training group is much more congruent in their self-structure" (p. 39).

This study is positively distinguished by its use of Western psychology to understand the mechanics of Yoga. However, this study contained some obvious methodological difficulties. For example, its "pre" and "post" groups of subjects were measured independently, making this a between-subject design. This approach poses a number of problems. First, it is impossible to determine whether the difference between the groups was due to the intervention, or whether the groups differed for some other reason. Second, if the subjects were assessed before and after the intervention, making the study a within-subject design, the statistical analysis would have had a much higher statistical power.

Finally, the theoretical foundation for this study may be elaborated a step further. Ran and Rao (1992) stated that body-image forms the foundation for the self-concept, because as early as in infancy, the body provides "boundary lines. . . and knowledge to distinguish between ME and NOT ME" (p. 35). This argument is confirmed by contemporary research in self-esteem, which has established the influence of physical self-perception on the overall self-concept (Fox & Corbin, 1989; Marsh, Richards, Johnson, Roche, et al., 1994). Therefore, in addition to using a personality scale to assess the subjects' self-perception, it would have been useful if the authors had inquired about the subjects' attitude toward their physical selves.

In a well-designed psychological study, Cusumano and Robinson (1992) compared the psycho-physiological effects of Hatha Yoga and Jacobson's method of progressive relaxation. The subjects included 95 Japanese undergraduate students, who enrolled in two physical education classes. Both relaxation and Yoga were taught in three

80-minute sessions. The study employed a within-subject design, using such measures as heart rate, blood pressure, and two standardized psychological scales: the Physical Self-Efficacy Scale (Ryckman, Robbins, Thornton & Cantrell, 1982) and the Rosenberg Self-Esteem Scale (Rosenberg, 1965). The procedures were carefully balanced, paying attention to such details as playing the same background music for both relaxation and Yoga. The study concluded that "both Hatha Yoga and progressive relaxation are effective relaxation procedures" (p. 86). It failed to find any difference between these approaches. In contrast to other studies, the current results showed that the self-efficacy scores decreased for Yoga students. The authors attributed this change to a more realistic self-perception at the end of a Yoga course.

Despite the methodological rigor of this study, it may be challenged for its theoretical approach. First, the authors viewed Hatha Yoga as a form of physical exercise, teaching postures without the discipline of the yogic breathing. A number of writers emphasize the importance of the breathing discipline (" pranayam ") as a crucial component of Yoga (Chandra, 1994; Harrigan, 1981; Nespor, 1991; Nespor, 1993; Ramaswami, 1989). Second, the study only lasted for three sessions, not allowing such crucial factors to develop as insight, self-awareness and relationship with the teacher and fellow students. The authors address these problems by noting in their discussion that "limitations come from the brief time-span of the experiment. . . not suitable for the measures of physical self-efficacy and self-esteem" (Cusumano & Robinson, 1992, p. 88).

D. Yoga and Physical Exercise

Berger and Owen (1992) compared the effects of Yoga and physical exercise on the psychological well-being. The authors examined the effect of attending swimming, Yoga and lecture courses on 101 college students. The authors evaluated their subjects at the beginning, the middle and the end of the semester, using standard psychological inventories: the Profile of Mood States (McNair, Lorr & Droppleman, 1971), the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch & Lushene, 1970) and the Lie Scale (Eysenck & Eysenck, 1968). The results showed significant, short-term mood benefits for the subjects who engaged in both Yoga and exercise. The subjects reported decreased scores of anger, confusion, tension and depression. Moreover, the participants in the Yoga course reported the same, or greater changes than the swimmers. This effect was especially significant for the male subjects. The authors conclude that, although "underlying and causal mechanisms remain uncertain," Yoga may be even more beneficial than an aerobic exercise (p. 1331).

Berger and Owen (1992) thoughtfully reflected on some limitations of their study. They noted that "use of the intact classes limited the interpretation of the data. . . [but] randomly assigning sedentary individuals to exercise is nearly impossible" (p. 1335). However, they paid less attention to the limitations of their measures. Their significant results were derived from the measures of the subjects' mood, reported by the scores on the Profile of Mood States inventory. By definition, mood is a variable psychological state (Watson & Clark, 1994). Therefore, their mood scale assessed the subjects'

psychological state at that moment, and not their enduring psychological characteristics. In contrast, when the researchers evaluated the subjects' anxiety trait, measured by the STAI, the scores remained the same throughout the study. This negative finding agrees with the outcome of other research which questions the ability of physical activity to cause a profound psychological change (Leith & Taylor, 1990).

E. The Current Project

The current project was intended to examine the effects of attending physical education (PE) courses on the well-being of students at a large state university. The project attempted to add to the existing, controversial body of research on the effects of engaging in physical activity. Specifically, the research focused on clarifying the mechanisms through which physical exercise may provide positive benefits. First, the project investigated a connection between the psychological change and the change in physical self-perception. Second, it compared the effect of engaging in two kinds of physical activity, traditional Western exercise and Yoga.

The current project included two studies, which posed the following hypotheses:

(1) Physical activity is beneficial for the subject's psychological well-being. Such benefits would reflect in significantly greater improvement on validated psychological measures for the Yoga and exercise students than for the control students. Such benefits would be confirmed by verbal statements from both the Yoga and exercise students.

(2) Yoga provides greater psychological benefits than traditional exercise. Such benefits would reflect in significantly greater improvement on validated psychological measures for the Yoga students than for the exercise students. Such benefits would be confirmed by a greater number of verbal statements from the Yoga students than from the exercise students, and by a greater intensity of such statements.

(3) Psychological improvement from physical activity is related to an improvement in the subjects' physical self-perception. Such a relationship would reflect in significant correlation between the scores on validated psychological measures which estimate the physical self-perception and the measures which estimate the change in psychological state. Such a relationship would be confirmed by a connection between the verbal statements describing physical activity and the statements describing physical changes.

(4) Initial attitude toward physical activity is related to its effectiveness. Such a relationship would reflect in significant correlation between the scores on the Attitude Scale and the scores on validated psychological measures. Such a relationship would be confirmed by a connection between the verbal statements describing initial motivation and the statements describing psychological benefits.

CHAPTER II

STUDY ONE

A. Methods

1. Subjects

Ninety-seven undergraduate students from the University of Massachusetts in Amherst participated in the study. All of the students were volunteers, recruited at the end of a regularly scheduled class session. They composed three separate groups. First, 42 of these students (5 male and 37 female) attended a Yoga class taught at the Department of Physical Education. The average age of the Yoga subjects was 22, which suggested that most of them were seniors, and some were non-traditional older students. The Yoga classes included Hatha Yoga I, Hatha Yoga II and Iyengar Yoga. All of these classes were taught at an aerobics studio by the same instructor, who is a full-time Yoga teacher in the Amherst community. The university regulations limited the class size to 25 students, and all of the Yoga classes were fully enrolled. Second, 28 subjects (4 male and 24 female) were enrolled in physical exercise classes at the Department of Physical Education. The average age of the exercise subjects was 21, which suggested that most of them were in their sophomore or junior year. The exercise classes included aerobics, weight training, jogging, swimming and tennis. They were taught at various locations

throughout the university gym, by student instructors. Each of these classes contained approximately 20 students. Third, 27 subjects (9 male and 16 female) attended the Methods in Psychology course, which typically enrolls approximately 200 students. This is a required course for students who consider becoming psychology majors. This group of subjects said that they generally abstain from regular physical exercise. The average age of the control subjects was 20, which confirmed that most of them were sophomores.

The subjects in the Yoga and physical exercise group were offered a choice of four research credits or five dollars, for participating in the study. The subjects in the psychology lecture were only offered research credits. Fifty-two subjects (15 in Yoga classes, 10 in physical exercise classes, and 27 in the psychology lecture) accepted the option of research credits.

The same subjects were contacted again at the end of the semester. Twenty seven Yoga students (2 male and 25 female), 20 physical exercise students (3 male and 17 female) and 18 psychology students (4 male and 14 female) completed both sets of questionnaires. Of these subjects, 17 Yoga students and 10 exercise students were paid for their participation. In addition, in completing the second set of questionnaires, some subjects filled out only a few randomly selected forms, or filled two-sided forms on one side only. Such incomplete sets were discarded. Therefore, analyses which included pre- and post-comparisons were conducted on the basis of 44 selected female clients: 20 in the Yoga group, 15 in the exercise group and nine in the control group.

2. Measures

Each subject received an identical envelope which included seven questionnaires. The order of the forms within the envelope was random. The subjects were asked to fill the forms out within the next few days and drop the envelope off in the campus mail. If the forms were not returned within ten days, the subjects were re-contacted by phone and reminded about the agreement.

The subjects were administered a general health questionnaire, based on a form used by the University of Massachusetts Health Services. The questionnaire contained a list of 14 items, listing common medical complaints. The subjects responded to each item as "yes" or "no." A copy of this scale is enclosed in Appendix A.

The subjects were also administered the Physical Self-Description Questionnaire (PSDQ; Marsh et al., 1994), which is a 70-item scale measuring a person's attitude toward the physical self. Each item is rated on a Likert scale from 1 (False) to 6 (True). Overall, the scale produces scores on eleven sub-scales, including Health, Appearance and Esteem. The PSDQ was designed in 1994 as an improvement upon the existing, similar scales . It was validated through two administrations, one involving 315 students of an Australian Outward Bound school program, and another involving 395 students of an Australian private high school. The external validity was confirmed through a comparison with existing, published scales. In addition, the measure was verified through the Confirmatory Factor Analysis (CFA) procedure. Internal consistency for the sub-scales was quite high (alpha ranging from .82 to .96). Although this study was

conducted with high school-age adolescents, Marsh et al. (1994) suggested that the scale may be used with the college-age US population. Another recent study (Todd, Deane & McKenna, 1997) also indicates that the non-patient college population responds to self-reports much like the adolescent population. A copy of the PSDQ is enclosed in Appendix B.

In addition, the subjects filled out The Hassles and Uplifts Scale (Kanner, Coyne, Schaefer& Lazarus, 1981; DeLongis, Folkman & Lazarus, 1988) which is a 53-item measure that provides an estimate of general life satisfaction. It produces separate scores for the number of uncomfortable and pleasurable everyday events. It requires the subject to rate each event on a 4-point Likert scale, once as a "hassle" and the other time as an "uplift." Originally, the Hassles and Uplifts Scale was designed as an alternative to the existing measures of life satisfaction, which typically tested the frequency of dramatic events in a person's life (Kanner, Coyne, Shaefer & Lazarus, 1980). Instead, the authors argued that preoccupation with "the irritating, frustrating, distressing demands that. . . characterize everyday transactions" would serve as a better measure of life satisfaction (p. 2). The original scale included 117 "hassle" and 135 "uplift" items. It had a high test-retest reliability (for hassles, r=.79; for uplifts, r=.72). It was validated with the older adults, college students and Canadian health-care professionals. Subsequently, the scale was revised to its current format of 53 items (DeLongis, Folkman & Lazarus, 1988). It was validated through a comparison with other measures of health satisfaction, self-esteem and emotional support. The test-retest reliability remained high, especially for the

"hassles" scale (for day-to-day retest, r=.77; for month-to-month retest, r=.82). A copy of this scale is enclosed in Appendix C.

To estimate subjects' level of cognitive anxiety, they were asked to fill out the Penn State Worry Questionnaire (Meyer, Miller, Metzger& Borkovec, 1990). This is a 16-item scale which contains a list of statements that describe the process of worrying. The inventory requires the subject to rate each item on the Likert scale from 1 (Not at all typical) to 5 (Very typical). The PSWQ was founded on the theoretical assumption that "the process of worry is pervasive to all of the anxiety disorders" (Meyer, Miller, Metzger & Borkovec, 1990, p. 487). It was thoroughly validated through a series of eight studies, one of which included as many as 405 college-age subjects. The external validity of the PSWQ was established by comparing it to other published personality measures, anxiety self-report scales and anxiety interview protocols. Its internal consistency was high (alpha = .93), and its one-month test-retest reliability was also high (r=.93). A copy of this scale is enclosed in Appendix D.

Since the literature on physical activity consistently refers to the concept of "self-esteem," the subjects were also asked to respond to the Rosenberg Self-Esteem Scale (Rosenberg, 1965). This is a 10-item scale estimating the subject's general self-esteem. It contains five positive and five negative items. Each item requires a response from 1 (Strongly agree) to 4 (Strongly disagree). This scale was originally designed as a brief instrument measuring the subject's degree of self-acceptance (Rosenberg, 1965). Since that time, it has been thoroughly validated with a variety of populations. For example one study included 5,024 high school-age subjects, and the other included 3,552 retirees.

Although there are numerous ways to score this scale, it is also valid to assign each item a score from 1 to 4, and to add them arithmetically (Ward, 1977). The scale has good internal consistency (alpha = .74) and high test-retest reliability (r=.85). A copy of this scale is enclosed in Appendix E.

To obtain the broad profile of the subjects' psychological well-being, they were administered the Symptom Check List-90, Revised (SCL-90R; Derogatis, 1994). This scale contains a list of 90 common symptoms that may serve as signs of depression, anxiety or another psychological disorder. It produces a number of sub-scales, including the measures of depression, anxiety, hostility and positive symptomatology. The scale requires the subject to rate each symptom on a Likert scale, from 0 (Not at all) to 4 (Extremely). The SCL-90R has been designed to assess a level of psychological symptomatology for a broad range of subjects, from psychiatric patients to medical patients to "normal" population (Derogatis, 1994). Since its original publication in 1973, this scale has been thoroughly validated with a variety of populations, including college students (Todd, Deane & McKenna, 1997). The nine SCL-90R sub-scales have good internal consistency (alpha ranging from .77 to .90) and good test-retest reliability (r ranging from .78 to .90) (Derogatis, 1994). However, with the college population, some caution must be used in interpreting the norms. The non-patient college students tend to respond like normal adolescent populations (Todd, Deane & McKenna, 1997). A copy of this scale is enclosed in Appendix F.

Finally, an attitude scale was designed for this study to assess the students' motivation for enrolling in each course. It contains 12 questions assessing such

dimensions as the previous experience with the course content, intentions for using the skills from the course for managing stress and their perception of the instructor's effectiveness. These questions were rated on a Likert scale, from 1 (Not at all) to 6 (Definitely). The attitude scale also contained a blank space at the bottom which was used to answer an open-ended question, "The main reason I signed up for this course is. . ." A copy of the attitude scale is included in Appendix G.

3. Procedure

A graduate student, who was the main investigator in this project, and an undergraduate research assistant shared the responsibility for recruiting the subjects. They followed a written scenario which prescribed contacting groups of students at the beginning or the end of their class hour during the first week of the Fall 1995 semester. They read to students a written description which stated that this was "a research project which studies whether, by playing sports, people feel better psychologically. . . and also compares Yoga to physical exercise." The researchers also read the instructions for filling out the forms, which stated, "We need approximately an hour of your time. . . You can do this at your convenience, any time during this week. . . We will also contact you again, later in the semester." The students were offered a reward for participating in the course and, if they agreed, were handed a consent form. The researcher retained the form and handed the subject an envelope with the questionnaires.

Approximately half of the subjects returned their envelopes by mail within two weeks, and all others were contacted by phone and reminded about the study.

In the last three weeks of the semester, the subjects were mailed copies of the same questionnaires and a stamped envelope for return mail. A brief description reminded the subjects about the study and thanked them for agreeing to be contacted again. Because many Yoga students lived off-campus, they were also contacted in person, at the beginning of their class hour. Because of the busy student schedules at the end of the semester, the consent form on the second batch of questionnaires contained a statement in bold large letters: "For your answers to be accepted for the study, please return these forms as soon as you can, definitely before the semester ends." In addition, all students received a phone call within a week of mailing the forms.

The majority of the completed questionnaires were returned by the US mail within two weeks.

B. Results

The responses to all questionnaires were coded and analyzed using the SYSTAT software (version 6.01 for Windows, designed by the SPSS Inc.) . The data focused on the following hypotheses:

(1) the measures of psychological well-being would show a difference among the Yoga, exercise and control groups at the beginning of the semester;

(2) the subjects' scores on the psychological scales would indicate a change in their well-being, toward the end of the semester;

(3) there would be systematic differences between the three groups of subjects, toward the end of the semester;

(4) the students' perception of their physical self would be positively related to the degree of their psychological change; and

(5) the students' attitude toward the PE class would positively related to the degree of psychological change, measured at the end of the semester.

1. Hypothesis One

Statistical analyses examined the differences between the three groups of students, near the time when they signed up for their PE courses. First, the analyses used the data obtained from the standard, validated questionnaires. Then, the analyses focused on the two measures designed for this study: the general health questionnaire and the attitude scale. Third, the analyses examined four potential confounding variables: age, payment for participation, previous experience with the course and willingness to follow through with both "pre" and "post" parts of the testing.

Scores from the standardized scales measuring the students' psychological state were unable to prove a selection bias between the three groups. This analysis used the data obtained during the first three weeks of the semester. The students' responses to the five measures -- SCL-90R, PSDQ, Penn State Worry Scale, Rosenberg Self-Esteem Scale

and Hassles and Uplifts Scale -- were summarized in Tables 2.1 through 2.3. The difference in the pattern of responses by the three subject groups was analyzed using a series of ANOVA and repeated-measures ANOVA (see Table 2.4). The results of these calculations were unable to show significant difference among the three sets of scores. The main effect of the group membership was not significant for the scores from the SCL-90R, PSDQ, Penn State Worry Scale, Rosenberg Self-Esteem Scale and Hassles and Uplifts Scale. Similarly, the main effect of gender was not significant for the scores from the SCL-90R, PSDQ, Penn State Worry Scale, Rosenberg Self-Esteem Scale and the "hassles" part of the Hassles and Uplifts Scale. Only the "uplifts" part of the Hassles and Uplifts Scale showed a difference between the male and female students. The male subjects endorsed the positive events significantly less frequently than the females ($\bar{x}$=18.33 and $\bar{x}$=23.01; $F(1,88)=4.13$, $p<.05$), and they reportedly experienced them with less intensity ($\bar{x}$=1.54 and $\bar{x}$=1.88; $F(1,88)=10.00$, $p<.001$).

Despite such consistent evidence for overall equivalence between groups, more thorough analysis of the data suggests that these results must be treated with caution. A number of post-hoc analyses showed systematic differences between the Yoga and exercise, and between the exercise and control groups of students. The results of these calculations are summarized in Table 2.5. First, the SCL-90R sub-scale scores showed that, at the beginning of the semester, the exercise students experienced more anxiety symptoms than the control students ($\bar{x}$=.55 and $\bar{x}$=.41; $F(1,84)=5.13$, $p<.03$). Also, the exercise students experienced more hostility than the Yoga students ($\bar{x}$=.76 and $\bar{x}$=.47; $F(1,84)=16.65$, $p<.001$) and than the control students ($\bar{x}$=.76 and $\bar{x}$=.46; $F(1,84)=10.24$,

$p<.001$). Similarly, the exercise students endorsed more symptoms of paranoid thinking than the control students ($\bar{x}=.78$ and $\bar{x}=.45$; $F(1,84)=7.92$, $p<.01$). Second, the PSDQ sub-scales showed that the exercise students rated themselves lower on appearance than the Yoga students ($\bar{x}=4.51$ and $\bar{x}=4.83$; $F(1,84)=9.37$, $p<.01$) and the control students ($\bar{x}=4.51$ and $\bar{x}=4.70$; $F(1,84)=5.88$, $p<.05$). However, the exercise group rated itself more active than both the Yoga group ($\bar{x}=4.61$ and $\bar{x}=3.44$; $F(1,84)=8.78$, $p<.01$) and than the control group ($\bar{x}=4.61$ and $\bar{x}=2.60$; $F(1,84)=17.52$, $p<.001$). Third, the scores on the Penn State Worry Scale suggested that the students in the exercise and Yoga groups were more worried than the students in the control group ($\bar{x}=53.70$ and $\bar{x}=53.51$ v. $\bar{x}=46.88$; $t=2.08$, $df=43$, $p<.05$).

Besides the five standardized scales, the analyses examined the students' responses to the two scales designed for this study. Like the previous data, responses to the medical questionnaire were unable to show a significant difference among the three groups of students. The questionnaire showed that, on the average, a student in each group had difficulty with two of the ten most common medical complaints (the list included, for example, "allergies," "skin" and "ear/eye"). ANOVA showed that the main effect of group membership was not significant ($F(2,83)=.32$, $p>.05$). The questionnaire also showed that, of the entire sample, one person had been hospitalized for food poisoning. Students denied using illegal drugs. In response to a question whether psychological problems interfered with students' functioning, affirmative responses were given by seven of the 37 Yoga subjects (19%), three of 27 exercise students (11%) and

four of 22 no-activity students (18%). The difference among the groups was not significant (X^2(df=2)=.78, p>.05).

Unlike the previous data, the attitude scale demonstrated significant between-group differences. It suggested that the three subject groups were motivated by significantly different sets of expectations in selecting their courses. The responses to the Attitude Scale were summarized in Table 2.6. Item Analysis showed that responses to four questions from this scale could form a total score assessing the subjects' motivation to improve their well-being. These questions asked whether the subject signed for the course to manage their stress, improve their physical health, add a spiritual dimension to their lives, or feel better psychologically. ANOVA of the total scores showed a significant main effect of the group membership (F(2,81)=28.96, p<.001) and of the subjects' gender (F(1,81)=8.33, p<.01). On the total scores indicating the degree of motivation, the Yoga students averaged the highest ($\bar{x}$=20.63), the exercise students were next ($\bar{x}$=17.19) and the control group averaged the lowest ($\bar{x}$=8.37). Females were more motivated than males ($\bar{x}$=17.82 v. $\bar{x}$=12.40). Separate Variance T-test demonstrated a significant differences in the scores of the Yoga and exercise groups (t=3.02, df=42, p<.01), as well as in the scores of the exercise and control groups (t=6.35, df=43, p<.01).

In addition to the total scores, individual questions on the attitude scale also indicated a between-group difference. The subjects in the Yoga group had approximately the same level of previous experience as the control group ($\bar{x}$=3.17 and $\bar{x}$=3.40, where 1 means "not at all" and 6 means "definitely"). However, the exercise students had

significantly higher levels of experience than both of these groups ($\bar{x}$=4.52). ANOVA confirmed that the main effect of the group membership was significant ($F(2,81)=3.58$, $p<.05$). Responding to a question which asked whether they considered this course as important as the other courses, the subjects in the Yoga group scored the same as the students in the required psychology course ($\bar{x}$=3.80 and $\bar{x}$=3.75, where 1 means "not at all" and 6 means "definitely"). However, the exercise students assigned significantly lesser importance to that course ($\bar{x}$=2.30). Again, ANOVA confirmed that the main effect of the group membership was significant ($F(2,81)=6.46$, $p<.005$).

In addition to the specific questions, the subjects provided a short open-ended narrative at the bottom of the page, describing their reasons for selecting the course. In response to this open-ended question, 11 Yoga students (17%) indicated a need to manage stress, whereas subjects in the other groups did not provide such responses. Twelve Yoga students (19%) said that they selected the course to relax; only one physical exercise student (3%) was motivated by that reason. Seven Yoga students (11%) indicated that they were seeking answers to some existential questions, such as spirituality or knowledge about the self, whereas such reasons were absent in the responses by other groups. In contrast, the exercise students seem motivated by a different set of reasons: physical health (27% of the exercise students v. 20% of the Yoga students), working out (23% of the exercise students v. 2% of the Yoga students) and fun (10% of the exercise students v. 2% of the Yoga students). The overall difference among these numbers was highly significant ($X^2(df=10)=74.4$, $p<.001$).

Finally, the analyses examined the effect of confounding variables: age, payment for participation, previous experience with the course and willingness to follow through with both "pre" and "post" parts of the testing. First, ANOVA was unable to show a significant difference in the ages of the Yoga, exercise and control students ($\bar{x}$=21.5 for Yoga, $\bar{x}$=20.5 for exercise, and $\bar{x}$=20 for control; F(2,59)=.51, p>.05). Second, repeated measures ANOVA, which included the scores of all SCL-90R sub-scales, was unable to find the difference between the subjects who selected payment and the subjects who received research credits (F(1,62)=.24, p>.05); between the subjects who selected a Yoga class for the second time (N=9) and the subjects who took their class for the first time (N=31) (F(1,38)=.11, p>.05); and between the subjects who followed through with the "pre" and "post" testing and those who filled out the forms only once (F(1,69)=2.06, p>.05). Third, Separate Variance T-test, which focused on the total SCL-90R score was unable to find significant differences for the first two of these confounding variables (t=.73, df=45, p>.05 and t=.55, df=17, p>.05). However, this T-test indicated a significant difference of the total SCL-90R score of the subjects who completed all tests and the subjects who filled out the first set of the inventories (t=2.46, df=20, p<.05). Finally, Separate Variance T-test, which focused on the SCL-90R index of the average symptom level was unable to show the significant effect for the three confounding variables (t=.73, df=45, p>.05; t=1.13, df=17, p>.05; t=1.79, df=14, p>.05). This set of analyses suggested that these confounding variables did not have a significant effect on the students' responses, except that the students who followed through with the "pre" and

"post" testing had significantly lower total SCL-90R scores than the rest of the population, indicating a generally lower level of distress.

2. Hypothesis Two

The next series of analyses examined the difference in the subjects' responses at the beginning and the end of the semester. These analyses were based on a reduced number of subjects. First, few males responded to both sets of questionnaires. To allow comparisons between groups, only female subjects were included in the analyses. Second, in the second mailing, a number of subjects returned envelopes which were missing a number of forms. Such incomplete packets were discarded. Finally, some students mailed their responses after the semester ended, and such forms were excluded from the study. As a result, 44 subjects were retained: 20 in the Yoga group, 15 in the exercise group and 9 in the control group.

The results showed a lack of significant change in the students' scores over the course of the semester. The changes in responses to the five standardized scales -- the SCL-90R, PSDQ, Penn State Worry Scale, Rosenberg Self-Esteem Scale and Hassles and Uplifts Scale -- were summarized in Tables 2.7 through 2.9. A series of repeated measures ANOVA and ANOVA were calculated to estimate the change in the subjects' well-being at the beginning and the end of the semester (Table 2.10). Of the five measures, only the Rosenberg Self-Esteem Scale showed a difference between the "pre" and "post" scores ($F(1,41)=5.09$, $p<.05$). In addition, the analysis examined the

interaction between the group membership and the changes in the subjects' scores. All scales indicated that this interaction was not significant.

Then, post-hoc analyses suggested that these results must be treated with some caution (see the results of ANOVA summarized in Table 2.11). First, repeated-measures ANOVA of individual SCL-90R and PSDQ sub-scales indicated a significant change in the subjects' scores for all three groups. Repeated-measures ANOVA of the SCL-90R hostility sub-scale showed that the students scored significantly higher at the end of the semester ($F(1,41)=8.73$, $p<.01$). These resulted indicated that the students became more aggressive toward the end of the semester ($\bar{x}=.57$ v. $\bar{x}=.67$). Similarly, ANOVA of the PSDQ activity sub-scale showed that the students scored significantly lower at the end of the semester ($F(1,41)=7.58$, $p<.01$). These results indicated that they became less physically active ($\bar{x}=3.54$ v. $\bar{x}=3.06$). Second, analysis of the Rosenberg Self-Esteem Scale suggested that the students' scores significantly decreased toward the end of the semester ($F(1,41)=5.09$, $p<.05$). These results indicated that the students endorsed fewer negative self-statements and felt more positive about themselves ($\bar{x}=16.59$ v. $\bar{x}=15.73$). Third, all students seemed to respond significantly differently to the "uplifts" part of the Hassles and Uplifts Scale ($t=2.32$, $df=43$, $p<.05$). It seemed that they endorsed fewer positive events as the semester neared the end ($\bar{x}=23.70$ v. $\bar{x}=21.20$).

3. Hypothesis Three

These analyses examined whether the groups of subjects became systematically different toward the end of the semester. Examination of a number of measurements, such as Penn State Worry, Rosenberg Self-Esteem and Hassles and Uplifts scales, showed a lack of difference. However, a more detailed analysis of the changes in the SCL-90R and PSDQ sub-scales suggested significant differences between the groups toward the end of the semester. The post-hoc Contrast Analyses of the changes in these sub-scales suggested that there were specific significant differences between the Yoga and exercise group, as well as between the exercise and control groups (see the results of Contrast Analyses in Table 2.11). These analyses suggested that the psychological changes in the Yoga group, as measured by the Somatization Sub-scale of the SCL-90R, happened at a significantly greater rate than the changes in the exercise group ($F(1,41)=4.07$, $p<.05$). It seemed that the Yoga students became more concerned about their bodies toward the end of the semester, at a significantly higher rate than the exercise students ($\bar{x}=.12$ v. $\bar{x}=-.11$). Similarly, the control group began to view own bodies more negatively, and the exercise students either improved in their physical self-perception, or else they changed less dramatically. Such differences were reflected in the scores of the PSDQ Activity, Flexibility, Endurance and Global Sub-scales. It seemed that the exercise students began to view themselves as a little less active, and the control students considered themselves much less active than at the beginning of the semester ($\bar{x}=-.24$ v. $\bar{x}=-.68$). Also, the exercise students reported becoming more flexible,

having a greater endurance and feeling more positive about their bodies, whereas the control students reported changes in the opposite direction ($\bar{x}$=.06 v. $\bar{x}$=-.06; $\bar{x}$=.21 v. $\bar{x}$=-.24; $\bar{x}$=.07 v. $\bar{x}$=-.26).

4. Hypothesis Four

These analyses addressed the hypothesis that the subjects' physical self-perception may be related to an improvement in the subjects' psychological well-being. To minimize Type 1 error, these analyses used selected scores from SCL-90R -- Hostility, Anxiety, Paranoid Thinking, Total and Positive Symptom Index -- and from the PSDQ -- Activity, Endurance, Appearance, Flexibility and Global. The previous analyses showed that these scores were most likely to capture the aspects of the students' well-being which change over the course of the semester.

To analyze the connection between the PSDQ and SCL-90R responses, Pearson correlation coefficients were calculated for the selected sub-scale scores (see Table 2.12 through 2.15). First, the results suggested that, for all students, the PSDQ Activity Sub-scale scores were related to a change in the SCL-90R Positive Symptom Index scores ($r=-.37$, $p<.03$). This relationship implied that the level of activity at the end of the semester was associated with a reduction in the intensity of symptoms. Second, for all students, the PSDQ Endurance Sub-scale scores were related to a change in the SCL-90R Positive Symptom Index scores ($r=-.29$, $p<.08$). This relationship implied that the level of endurance at the end of the semester was associated with a reduction in the intensity of

symptoms. Third, for the Yoga students, the PSDQ Global Sub-scale scores were related to a change in the SCL-90R Somatization Sub-scale scores ($r=-.47$, $p<.08$). This relationship implied that the general positive view of the body at the end of the semester was associated with a reduction in the somatic symptoms. Fourth, for the exercise students, the PSDQ Activity and Endurance Sub-scale scores were related to a change in the SCL-90R Somatization Sub-scale scores ($r=.54$, $p<.05$; and $r=.49$, $p<.08$). This relationship implied that the general positive view of the body at the end of the semester was associated with an increase in the somatic symptoms. Finally for the control group, the PSDQ Appearance and Global Sub-scale scores were related to a change in the SCL-90R Anxiety, Hostility and Paranoid Thinking Sub-scales scores ($r=.78$, $p<.01$; and $r=-.83$, $p<.01$; and $r=-.69$, $p<.05$;). This relationship implied the perception of self as attractive at the end of the semester was associated with an increase in the anxiety symptoms. In contrast, the general positive view of the body was associated with a reduction in the hostility and paranoid symptoms.

Multiple Regression Analysis confirmed the significance of a relationship between the SCL-90R Positive Symptom Index and the scores in the PSDQ Activity and Endurance Sub-scales at the end of the semester ($R=.38$, $p<.05$). This regression model is graphically illustrated in Figure 2.1. As in previous analyses, this model suggested that the subjects' levels of activity and endurance were related to a reduction in their psychological distress. This relationship seemed to apply to all groups of students, including the control group.

5. Hypothesis Five

The analyses below examined a relationship between the subjects' initial attitude toward the course and the subsequent change in their psychological well-being. The initial attitude was determined by the students' open-ended responses, written at the bottom of the Attitude Scale forms, collected at the beginning of the semester. The investigator rated these statements as "seeking stress reduction," "seeking relaxation," or "other." At times, subjects mentioned more than one type of reason for selecting a course. The students' SCL-90R scores within these categories are summarized in Table 2.16.

Contrast Analysis of the individual SCL-90R sub-scales suggested some significant relationships between the subjects' attitude and their well-being (Table 2.17). The subjects who indicated that they selected the course to reduce stress reported significantly higher somatic symptoms at the end of the semester than those subjects who provided a different reason ($\bar{x}$=.414 and $\bar{x}$=.738, $F(1,42)=5.07$, $p<.05$). All of the subjects in the "stress" group attended Yoga classes. Second, Contrast Analysis was used to examine the difference between the subjects who were seeking relaxation and those who provided a different reason. The subjects in the "relax" category reported significantly higher somatic symptoms ($\bar{x}$=.411 and $\bar{x}$=.750, $F(1,42)=5.62$, $p<.05$) and obsessive-compulsive symptoms ($\bar{x}$=.606 and $\bar{x}$=1.113, $F(1,42)=5.83$, $p<.05$) at the end of the semester. The majority of these subjects belonged to the Yoga group.

Table 2.1. Students' scores on the SCL-90R scale, at the beginning of the semester.

	ALL GROUPS	YOGA	EXERCISE	CONTROL
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
TOTAL SYMPTOMS	56.57 (66.46 & 46.67)	61.67 (79.27 & 44.10)	58.62 (77.70 & 39.58	45.83 (58.65 & 33.01)
POSITIVE SYMPTOM INDEX	1.49 (1.59 & 1.40)	1.57 (1.73 & 1.40)	1.50 (1.68 & 1.32)	1.36 (1.49 & 1.22)
SUB-SCALES				
Somatization	.61 (.72 & .49)	.72 (.94 & .49)	.57 (.74 & .41)	.47 (.62 & .32)
Obsessive.	.88 (1.02 & .74)	1.01 (1.25 & .77)	.80 (1.07 &.54)	.74 (.94 & .54)
Interp. Sensit.	.80 (.96 & .65)	.83 (1.10 & .56)	.84 (1.15 &.52)	.72 (.97 & .47)
Depress.	.81 (.95 & .67)	.90 (1.14 & .65)	.82 (1.11 &.54)	.64 (.84 & .45)
Anxiety	.53 (.65 & .41)	.59 (.81 & .38)	.55 (.80 & .30)	.41 (.56 & .25)
Hostility	.55 (.71 & .40)	.47 (.67 & .28)	.76 (1.13 &.38)	.46 (.75 & .18)
Phobic Id.	.20 (.28 & .12)	.22 (.36 & .08)	.25 (.41 & .08)	.12 (.19 & .04)
Paranoid Id.	.61 (.75 & .48)	.60 (.83 & .38)	.78 (1.08 & .48)	.45 (.62 & .28)
Psychoticism	.41 (.51 & .31)	.45 (.63 & .27)	.42 (.58 & .25)	.33 (.49 & .16)

* All confidence intervals were calculated at 95% probability.

Table 2.2. Students' scores on the PSDQ scale, at the beginning of the semester.

	ALL GROUPS	YOGA	EXERCISE	CONTROL
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
SUB-SCALES				
Health	4.40 (4.64 & 4.17)	4.23 (4.61 & 3.85)	4.60 (5.01 & 4.19)	4.49 (4.96 & 4.02)
Coordination	4.28 (4.49 & 4.06)	4.34 (4.62 & 4.05)	4.32 (4.81 & 3.83)	4.12 (4.59 & 3.66)
Activity	3.54 (3.85 & 3.23)	3.44 (3.88 & 3.01)	4.61 (5.16 & 4.06)	2.60 (3.02 & 2.17)
Fat	4.47 (4.75 & 4.19)	4.39 (4.81 & 3.96)	4.73 (5.31 & 4.16)	4.33 (4.84 & 3.81)
Appearance	4.72 (4.92 & 4.51)	4.83 (5.10 & 4.57)	4.51 (5.01 & 4.01)	4.74 (5.08 & 4.39)
Strength	4.25 (4.46 & 4.03)	4.38 (4.68 & 4.08)	4.05 (4.56 & 3.53)	4.22 (4.55 & 3.89)
Flexibility	4.35 (4.60 & 4.10)	4.46 (4.79 & 4.13)	4.59 (5.14 & 4.04)	3.91 (4.42 & 3.40)
Self-Esteem	5.13 (5.30 & 4.96)	5.17 (5.40 & 4.93)	5.11 (5.51 & 4.71	5.09 (5.42 & 4.76)
Global	4.25 (4.48 & 4.03)	4.30 (4.61 & 3.99)	4.41 (4.90 & 3.92)	4.01 (4.46 & 3.57)

* All confidence intervals were calculated at 95% probability.

Table 2.3. Students' scores on the Penn State Worry Scale, Rosenberg Self-Esteem Scale and Hassles and Uplifts Scale, at the beginning of the semester.

	ALL GROUPS	YOGA	EXERCISE	CONTROL
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
PENN STATE WORRY SCALE	51.73 (54.56 & 48.91)	53.51 (57.16 & 49.86)	53.70 (59.96 & 47.45	46.88 (52.62 & 41.15)
ROSENBERG SELF-ESTEEM SCALE	18.21 (19.34 & 17.08)	18.83 (20.46 & 17.20)	17.81 (20.02 & 15.61)	17.65 (20.10 & 15.20)
HASSLES AND UPLIFTS SCALE				
Frequency of Hassles	20.26 (22.14 & 18.37)	20.20 (22.60 & 17.80)	19.81 (23.20 & 16.41)	20.83 (25.84 & 15.83)
Intensity of Hassles	1.58 (1.66 & 1.50)	1.59 (1.72 & 1.45)	1.68 (1.84 & 1.51)	1.47 (1.60 & 1.33)
Frequency of Uplifts	22.23 (23.97 & 20.50)	21.55 (24.10 & 19.00)	22.62 (25.72 & 19.51)	22.96 (27.00 & 18.91)
Intensity of Uplifts	1.82 (1.91 & 1.74)	1.79 (1.93 & 1.66)	1.95 (2.10 & 1.81)	1.73 (1.89 & 1.57)

* All confidence intervals were calculated at 95% probability.

Table 2.4. Difference between the Yoga, exercise and control groups, at the beginning of the semester.

NAME OF SCALE	STATISTICAL TEST	MAIN EFFECT OF GROUP MEMBERSHIP	MAIN EFFECT OF GENDER
SCL-90R			
Total Score	ANOVA	F(2,84)=1.60	F(1,84)=1.69
Positive Symptom Index	ANOVA	F(2,84)=1.82	F(1,84)=2.18
All sub-scales	Repeated measures ANOVA	F(2,84)=2.42	F(1,84)=2.47
PSDQ			
All sub-scales	Repeated measures ANOVA	F(2,83)=.19	F(1,83)=.14
PENN STATE WORRY	ANOVA	F(2,88)=1.12	F(1,88)=2.70
ROSENBERG SELF-ESTEEM	ANOVA	F(2,88)=1.12	F(1,88)=.65
HASSLES AND UPLIFTS			
Frequency of hassles	ANOVA	F(2,88)=.25	F(1,88)=0.03
Intensity of hassles	ANOVA	F(2,88)=.63	F(1,88)=0.10
Frequency of uplifts	ANOVA	F(2,88)=.21	F(1,88)=4.13*
Intensity of uplifts	ANOVA	F(2,88)=.49	F(1,88)=10.00**

* = $p<.05$

** = $p<.001$

Table 2.5. Post-hoc analyses of the differences between the Yoga, exercise and control groups, at the beginning of the semester.

NAME OF SCALE	STATISTICAL TEST	SUBJECT GROUPS	RESULT
SCL-90R			
Anxiety Sub-scale	ANOVA	Yoga, exercise and control	F(2,84)=2.59, p<.08
	Contrast Analysis	Exercise and control	F(1,84)=5.13, p<.03
Hostility Sub-scale	ANOVA	Yoga, exercise and control	F(2,84)=8.63, p<.001✠
	Contrast Analysis	Yoga and exercise	F(1,84)=16.65, p<.001✠
		Exercise and control	F(1,84)=10.24, p<.001✠
Paranoid Sub-scale	ANOVA	Yoga, exercise and control	F(2,84)=1.91, p<.01
	Contrast Analysis	Exercise and control	F(1,84)=7.92, p<.01
PSDQ			
Appearance Sub-scale	Contrast Analysis	Yoga and exercise	F(1,84)=9.37, p<.01
		Exercise and control	F(1,84)=5.88, p<.05
Activity Sub-Scale	Contrast Analysis	Yoga and exercise	F(1,84)=8.78, p<.01
		Exercise and control	F(1,84)=17.52, p<.001✠
PENN STATE WORRY SCALE	Contrast Analysis	(Exercise and Yoga) v. control	t=2.08, df=43, p<.05

✠ Results significant at the Bonferroni level (p<.006)

Table 2.6. Students' scores on the Attitude Questionnaire, at the beginning of the semester.

QUESTIONS	ALL GROUPS Mean Scores (Confidence Intervals, Upper & Lower)*	YOGA Mean Scores (Confidence Intervals, Upper & Lower)	EXERCISE Mean Scores (Confidence Intervals, Upper & Lower)	CONTROL Mean Scores (Confidence Intervals, Upper & Lower)
Total motivation to improve health	16.89 (18.24 & 15.53)	20.63 (21.75 & 19.51)	17.19 (19.24 & 15.13)	8.37 (10.40 & 6.34)
Previous experience with the course	3.74 (4.22 & 3.25)	3.17 (3.89 & 2.45)	4.52 (5.18 & 3.86)	3.40 (5.66 & 1.14)
Importance of the course, in comparison with other classes	3.33 (3.66 & 3.00)	3.80 (4.19 & 3.42)	2.30 (2.90 & 1.70)	3.75 (4.52 & 2.98)

* All confidence intervals were calculated at 95% probability.

Table 2.7. Change in the students' scores on the SCL-90R scale, from the beginning to the end of the semester.

	ALL GROUPS	YOGA	EXERCISE	CONTROL
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
TOTAL SYMPTOMS	1.55 (7.73 & -4.62)	4.57 (15.98 & -6.87)	-4.37 (1.51 & -10.26	4.70 (21.74 & -12.34)
POSITIVE SYMPTOM INDEX	.08 (.18 & -.02)	.11 (.28 & -.06)	-.02 (.12 & -.15)	.17 (.41 & -.07)
SUB-SCALES				
Somatization	.03 (.14 & -.07)	.12 (.32 & -.08)	-.11 (.00 & -.22)	.08 (.28 & -.12)
Obsessive.	.06 (.19 & -.06)	.07 (.33 & -.20)	.07 (.23 & -.08)	.04 (.26 & -.18)
Interp. Sensit.	-.04 (.10 & -.18)	-.01 (.23 & -.24)	-.14 (.04 & -.31)	.03 (.46 & -.39)
Depress.	.05 (.17 & -.06)	.08 (.27 & -.11)	-.02 (.10 & -.13)	.11 (.51 & -.28)
Anxiety	.00 (.09 & -.10)	.06 (.22 & -.11)	-.05 (.08 & -.18)	-.05 (.22 & -.32)
Hostility	.12 (.23 & .02)	.11 (.26 & -.03)	.02 (.19 & -.15)	.30 (.62 & -.02)
Phobic Id.	-.05 (.00 & -.11)	-.05 (.04 & -.14)	-.06 (.07 & -.19)	-.05 (.04 & -.13)
Paranoid Id.	.04 (.15 & -.06)	.10 (.25 & -.05)	-.05 (.07 & -.18)	.08 (.48 & -.33)
Psychoticism	.01 (.08 & -.05)	.05 (.16 & -.07)	-.06 (.03 & -.14)	.06 (.18 & -.06)

* All confidence intervals were calculated at 95% probability.

Table 2.8. Change in the students' scores on the PSDQ scale, from the beginning to the end of the semester.

	ALL GROUPS	YOGA	EXERCISE	CONTROL
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
SUB-SCALES				
Health	.01 (.19 & -.18)	-.07 (.27 & -.42)	-.06 (.18 & -.30)	.26 (.58 & -.05)
Coordination	.06 (.27 & -.16)	.09 (.39 & -.21)	.18 (.52 & -.17)	-.18 (.50 & -.87)
Activity	-.38 (-.12 & -.64)	-.24 (.20 & -.67)	-.38 (-.02 & -.74)	-.68 (.02 & -1.38)
Fat	-.07 (.13 & -.27)	.01 (.28 & -.26)	.10 (.41 & -.21)	-.48 (.11 & -1.08)
Sports	.01 (.20 & -.18)	-.11 (.21 & -.43)	.18 (.50 & -.13)	.02 (.41 & -.38)
Appearance	.04 (.17 & -.09)	.03 (.25 & -.19)	.14 (.31 & -.04)	-.08 (.27 & -.42)
Strength	.07 (.23 & -.10)	-.09 (.18 & -.35)	.37 (.63 & .12)	-.04 (.32 & -.40)
Flexibility	-.01 (.17 & -.18)	-.03 (.28 & -.34)	.06 (.32 & -.19)	-.06 (.34 & -.47)
Endurance	.00 (.17 & -.17)	-.02 (.28 & -.33)	.21 (.44 & -.02)	-.24 (.11 & -.60)
Self-Esteem	.03 (.15 & -.08)	.00 (.19 & -.18)	.03 (.29 & -.22)	.09 (.24 & -.06)
Global	-.08 (.14 & -.31)	-.10 (.26 & -.46)	.07 (.33 & -.20)	-.26 (.42 & -.94)

* All confidence intervals were calculated at 95% probability.

Table 2.9. Change in the students' scores on the Penn State Worry Scale, Rosenberg Self-Esteem Scale and Hassles and Uplifts Scale, from the beginning to the end of the semester.

	ALL GROUPS	YOGA	EXERCISE	CONTROL
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
PENN STATE WORRY SCALE	1.95 (4.60 & -.69)	3.45 (7.65 & -.75)	-.43 (4.62 & -5.48)	2.33 (8.10 & -3.43)
ROSENBERG SELF-ESTEEM SCALE	-.86 (-.05 & -1.68)	-.20 (1.16 & -1.56)	-1.67 (-.24 & -3.10)	-1.00 (.63 & -2.63)
HASSLES AND UPLIFTS SCALE				
Frequency of Hassles	.95 (3.44 & -1.53)	2.05 (5.03 & -.93)	-1.27 (4.79 & -7.32)	2.22 (7.07 & -2.62)
Intensity of Hassles	.11 (.23 & -.01)	.09 (.23 & -.05)	.07 (.31 & -.17)	.25 (.62 & -.12)
Frequency of Uplifts	-2.50 (-.33 & -4.67)	-.70 (3.14 & -4.54)	-3.33 (.36 & -7.03)	-5.11 (-1.69 & -8.54)
Intensity of Uplifts	-.05 (.06 & -.16)	.01 (.19 & -.18)	-.21 (-.03 & -.40)	.10 (.30 & -.11)

* All confidence intervals were calculated at 95% probability.

Table 2.10. Repeated-Measures ANOVA analyses of the changes in the students' scores from the beginning to the end of the semester.

NAME OF SCALE	Effect of Time Difference ("Pre" and "Post") on Scores	Interaction between Time Difference ("Pre" and "Post") and Group Membership
SCL-90R		
Total Score	F(1,44)=.26	F(2,44)=.96
Positive Symptom Index	F(1,44)=3.15	F(2,44)=1.17
All sub-scales	F(1,44)=.61	F(2,44)=1.95
PSDQ		
All sub-scales	F(1,51)=.53	F(2,51)=2.37
PENN STATE WORRY	F(1,40)=1.66	F(2,40)=1.58
ROSENBERG SELF-ESTEEM	F(1,41)=5.09*	F(2,41)=.47
HASSLES AND UPLIFTS		
Hassles and Uplifts (frequency of responses)	F(1,41)=0.99	F(2,41)=0.10
Hassles and Uplifts (intensity of responses)	F(1,41)=1.26	F(2,41)=0.10

* = $p<.05$

Table 2.11. Post-hoc analyses of the changes in the students' scores from the beginning to the end of the semester.

NAME OF SCALE	TYPE OF TEST	SUBJECT GROUPS	EFFECT TYPE	RESULTS
SCL-90R				
Hostility Sub-scale	Repeated Measures ANOVA	Yoga, exercise and control	Main Effect of Time	F(1,41)=4.88*
Somatization Sub-scale	Contrast Analysis	Yoga and exercise	Interaction between Time and Group Membership	F(1,41)=4.07*
PSDQ				
Activity Sub-Scale	Repeated Measures ANOVA	Yoga, exercise and control	Main Effect of Time	F(1,41)=7.58**
Activity Sub-Scale	Contrast Analysis	Exercise and control	Interaction between Time and Group Membership	F(1,41)=10.06**
Flexibility Sub-Scale	Contrast Analysis	Exercise and control	Interaction between Time and Group Membership	F(1,41)=5.22*
Endurance Sub-Scale	Contrast Analysis	Exercise and control	Interaction between Time and Group Membership	F(1,41)=6.76*
Global Sub-Scale	Contrast Analysis	Exercise and control	Interaction between Time and Group Membership	F(1,41)=5.47*
HASSLES AND UPLIFTS SCALE				
Frequency of Uplifts	Separate Variance T-test	Yoga, exercise and control	Difference between "pre" and "post" groups	t=2.32, df=43*

* = $p<.05$
** = $p<.01$
✠ = Bonferonni $p < .006$

Table 2.12. Correlation between the final PSDQ scores and the change in the SCL-90R scores, for all students (N=40).

SCL-90R SUB-SCALES	PSDQ SUB-SCALES				
	Appearance	Activity	Flexibility	Endur.	Global
Anxiety	.07	-.01	.06	.17	.04
Somatization	-.09	-.08	-.03	-.02	-.24
Hostility	-.04	-.14	-.06	-.08	-.28
Paranoid Thinking	-.17	-.06	-.07	-.16	-.28*
Total	.04	-.18	.01	-.02	-.18
Positive Symptom Index	.14	-.37***	-.05	-.29*	-.23

* = p<.08
** = p<.05
*** = p<.03

Table 2.13. Correlation between the final PSDQ scores and the change in the SCL-90R scores, for the Yoga students (N=16).

SCL-90R SUB-SCALES	PSDQ SUB-SCALES				
	Appearance	Activity	Flexibility	Endur.	Global
Anxiety	-.10	-.25	.12	.23	.17
Somatization	-.28	-.28	-.19	-.15	-.47*
Hostility	.39	-.21	.07	-.20	.07
Paranoid Thinking	-.20	.04	-.13	-.16	-.10
Total	-.05	-.37	-.12	-.02	-.09
Positive Symptom Index	.07	-.22	-.09	-.08	-.04

* = p<.08
** = p<.05
*** = p<.03

Table 2.14. Correlation between the final PSDQ scores and the change in the SCL-90R scores, for the exercise students (N=15).

SCL-90R SUB-SCALES	PSDQ SUB-SCALES				
	Appearance	Activity	Flexibility	Endur.	Global
Anxiety	-.15	.25	-.06	.21	-.13
Somatization	.31	.54**	.23	.49*	.26
Hostility	-.29	.27	.02	.34	-.16
Paranoid Thinking	-.39	.09	-.08	.06	-.27
Total	-.10	.37	.20	.32	-.12
Positive Symptom Index	.18	-.45	-.09	-.39	-.23

* = p<.08
** = p<.05
*** = p<.03

Table 2.15. Correlation between the final PSDQ scores and the change in the SCL-90R scores, for the control students (N=9).

SCL-90R SUB-SCALES	PSDQ SUB-SCALES				
	Appearance	Activity	Flexibility	Endur.	Global
Anxiety	.78***	.28	-.04	.24	-.03
Somatization	-.06	.38	.28	.17	.05
Hostility	-.02	-.45	-.24	-.53	-.83***
Paranoid Thinking	.16	-.47	-.02	-.49	-.69**
Total	.52	-.08	.20	-.04	-.38
Positive Symptom Index	.46	-.27	.20	-.23	-.39

* = p<.08
** = p<.05
*** = p<.01

Table 2.16. Students' scores on the SCL-90R scale, divided according to their initial attitude toward the course.

	STRESS	NO MENTION OF STRESS	RELAX	NO MENTION OF RELAX.
	Mean Scores (Confidence Intervals, Upper & Lower)*	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)	Mean Scores (Confidence Intervals, Upper & Lower)
TOTAL SYMPTOMS	49.75 (67.38 & 32.12)	36.58 (45.45 & 27.72)	54.13 (74.14 & 34.11)	35.16 (44.10 & 27.12)
POSITIVE SYMPTOM INDEX	1.45 (1.64 & 1.26)	1.44 (1.58 & 1.30)	1.59 (1.93 & 1.25)	1.41 (1.54 & 1.28)
SUB-SCALES				
Somatization	.74 (1.03 & .44)	.41 (.54 & .29)	.75 (1.14 & .36)	.41 (.53 & .30)
Obsessive.	.76 (1.21 & .32)	.68 (.88 & .49)	1.11 (1.86 &.36)	.61 (.75 & .46)
Interp. Sensit.	.73 (1.18 & .27)	.49 (.63 & .34)	.69 (1.22 & .15)	.49 (.63 & .35)
Depress.	.73 (1.06 & .39)	.56 (.70 & .42)	.84 (1.25 &.43)	.54 (.66 & .41)
Anxiety	.46 (.66 & .26)	.59 (.81 & .38)	.50 (.66 & .34)	.27 (.39 & .15)
Hostility	.41 (.73 & .09)	.37 (.50 & .24)	.45 (.76 &.14)	.36 (.49 & .23)
Phobic Id.	.05 (.09 & .01)	.05 (.10 & .00)	.04 (.08 & .00)	.05 (.10 & .00)
Paranoid Id.	.51 (.73 & .29)	.38 (.49 & .26)	.35 (.58 & .12)	.41 (.52 & .30)
Psychoticism	.26 (.49 & .03)	.25 (.36 & .14)	.36 (.62 & .10)	.23 (.33 & .12)

* All confidence intervals were calculated at 95% probability.

Table 2.17. Post-hoc Contrast Analyses of the effect on subject's attitude on their SCL-90R scores, at the end of the semester.

NAME OF SCALE	INITIAL REASON FOR THE COURSE	RESULT
SCL-9OR		
Somatization Sub-scale	"Reduce stress" v. No mention of stress	F(1,42)=5.07, p<.05
	"Relax" v. No mention of relaxation	F(1,42)=5.62, p<.05
Obsessive-Compulsive Sub-scale	"Relax" v. No mention of relaxation	F(1,42)=5.83, p<.05

✠ Results significant at the Bonferroni level (p<.02)

CHAPTER III

DISCUSSION OF STUDY ONE

At the onset of the study, it was necessary to verify that the selected groups of Yoga and exercise students were equivalent both physically and psychologically. Then, it was possible to examine the difference in the subjects' experience of stress, the connection between their physical self-perception and their psychological well-being and, last, their reasons for selecting the course.

A. Selection of Subject Groups

Analyses were unable to find a significant difference between the three subject groups. The students in all groups appeared to represent a similar psychological profile. Five different self-report measures were used to assess the students' psychological state at the beginning of the semester. These instruments evaluated a wide range of their experience, including the students' self-perception, general life satisfaction, worry, anxiety, depression and hostility. Statistical analyses of the subjects' responses consistently denied a selection bias between the groups. The subjects in the Yoga, exercise and "no activity" groups displayed a similar pattern of responses to SCL-90R scale, which collected a information about the subjects' experience of psychological distress symptoms. The students in all three groups provided similar responses to the

PSDQ scale, which measured such aspects of their self-perception as health, appearance and esteem. The three groups reported a similar degree of worry on the Penn State Worry Scale. They endorsed a similar number of negative self-statements on the Rosenberg Self-Esteem Scale. Except for the Hassles and Uplifts scale, all of the these scales suggested a lack of difference between the psychological well-being of the male and female students. However, the Hassles and Uplifts scale showed that the female students reported a higher frequency and greater intensity of pleasant events in their lives. This finding suggested that the female undergraduates may experience a greater life satisfaction. Nevertheless, as with other self-reports, there was no difference in the scores of life satisfaction between the Yoga, exercise or "no activity" groups of female students.

Besides these psychological measures, students were given a medical survey and asked to mark whether they experienced difficulty with common health complaints, for example, "allergies," "skin" and "ear/eye." On the average, each student marked two of the ten items. Of the entire sample of 97 students, only one person was hospitalized within the two weeks prior to the study, for food poisoning. There were no differences in such responses between the Yoga, exercise or control group.

Despite such strong evidence supporting the overall equivalence of the three groups, some systematic differences did exist. For instance, in their responses to the form assessing their previous experience, the exercise students reported greater familiarity with course content than the Yoga students. These results supported an observation that most students in the "conditioning" class, for example, were already familiar with running and weight-lifting at the onset of the semester. In contrast, a proportion of the Yoga students

included the subjects from the introductory class, who encountered this discipline for the first time.

In addition to such findings, post-hoc analyses of the SCL-90R and PSDQ sub-scales indicated some differences in the subjects' reports of distress and self-perception. First, the SCL-90R Anxiety, Hostility and Paranoid Thinking Sub-scales suggested that the exercise students experienced a greater degree of internal arousal than the control group. Second, the PSDQ Appearance and Activity Sub-scale showed that the exercise students rated themselves as being more active and less attractive, in comparison to both the Yoga and control groups. Finally, the Penn State Worry Scale suggested that the control students were less worried than the students in the other two groups. The pattern of these post-hoc analyses suggests that the experience of psychological stress may play a significant role in the students' selection of a PE course. Such stress may be defined as an experience of internal arousal, expressed through the symptoms of anxiety, worry, hostility and paranoid thinking.

B. Students' Experience of Stress

The data allowed an assessment of the change in the students' level of stress, toward the end of the semester. The results of these analyses were contradictory. On the one hand, there was a strong evidence that the students' psychological state remained the same, during the three months between the "pre" and "post" measurements. Four main scales employed by this study -- the SCL-90R, PSDQ, Hassles and Uplifts, and Penn

State Worry Scale -- indicated that the students felt the same at the beginning and the end of the study. These scales suggested that the students reported approximately the same level of symptomatology, physical self-perception, general life satisfaction and level of worry. Only one scale, the Rosenberg Self-Esteem Scale, showed a significant difference between the "pre" and "post" measures. It suggested that the students endorsed less negative self-statements toward the end of the semester. On the other hand, the analyses of confounding variables showed that the students who followed through with the "pre" and "post" testing had significantly lower total SCL-90R scores than the rest of the population, indicating a generally lower level of distress. That finding suggested that, if all students participated in both "pre" and "post" testing, the results would likely show a higher level of symptoms. In addition, post-hoc analyses indicated a number of significant differences. The SCL-90R hostility sub-scale suggested that the students were exhibiting more symptoms of anger and hostility, at the end of the semester. The PSDQ activity sub-scale suggested that the students were perceiving themselves as less active. In addition, the Frequency of Uplifts score within the Hassles and Uplifts scale showed a significant decrease in the number of positive events, toward the end of the semester. However, considering the number of post-hoc comparisons, it was likely to find some post-hoc differences among a few of these sets of scores. Therefore, the review of these results suggested that the students experienced a greater degree of psychological distress toward the end of the semester, but that such a conclusion needed further verification with additional data.

The present data also indicated that the groups became significantly different toward the end of the semester. Contrast Analyses of the individual groups of students suggested that the some differences developed between the Yoga and exercise students, as well as between the exercise and control students. Specifically, the Yoga students reported experiencing greater symptoms of somatization toward the end of the semester than the exercise students. Likewise, the PSDQ scores suggested that the exercise students began to view themselves more positively than the control group. The students reported being more active and more flexible, having higher endurance and feeling more satisfied in life. These results suggested that, although all students' were experiencing stress toward the end of the semester, the exercise students were coping more effectively with the stress symptoms than the Yoga and control groups.

C. Physical Self-Concept and Psychological Well-Being

Empirical data provided the evidence that the students' self-concept was significantly related to their psychological well-being. A number of associations were suggested by the correlation coefficients, which approached to or satisfied the requirements of statistical significance. First, for all students, the degree of physical activity and their level of endurance at the end of the semester was associated with a reduction in the intensity of symptoms. Second, for the Yoga students, a general positive view of the body at the end of the semester was associated with a reduction in the somatic symptoms. Finally for the control group, perception of self as attractive at the end of the

semester was associated with an increase in the anxiety symptoms, but a general positive view of the body was associated with a reduction in the hostility and paranoid symptoms.

These initial conclusions were confirmed by a regression analysis which suggested that, for all subjects, their activity and endurance scores were significantly related to a reduction in their scores of psychological distress. These results suggested that the students felt their stress symptoms significantly less intensely as they became more physically active, and as their level of physical endurance increased.

D. Reasons for Selecting a Course

The subjects' responses to the Attitude Scale provided strong evidence that the students' reasons for selecting a course were significantly different for the Yoga and exercise students. This Attitude Scale was designed specifically for this project, and Item Analysis showed that the total score for four selected items from this scale is valid for assessing the subjects' motivation to improve their well-being. Analysis of the scores at the beginning of the semester suggested that there were significant differences between the groups. The data indicated that the Yoga students were the most motivated and the control students were the least motivated.

Such empirical findings were collaborated by the students' open-ended statements at the bottom of the Attitude Scale. The Yoga students were more likely to write down a wish to manage stress or relax, whereas only one exercise student reported a similar motivation. In contrast, the exercise students were more likely to report that they wanted

to improve their physical health, work out or have fun. In addition, analysis of these open-ended statements suggested a connection between the students' attitude at the beginning of the semester and their subsequent psychological well-being. It appeared that the students who selected their PE course to reduce stress also reported significantly higher somatic symptoms at the end of the semester. Similarly, the students who selected their PE course to relax also reported significantly higher somatic and obsessive-compulsive symptoms at the end of the semester. The majority of these subjects belonged to the Yoga group. These analyses questioned the effectiveness of a PE course, especially Yoga, if it was selected with a specific intention to manage stress or increase relaxation.

E. Conclusions

Considering the results of these analyses, it appeared that the three groups were initially equivalent on a broad range of psychological scales. They represented a random sample of a healthy undergraduate population. However, the students reported feeling more distressed toward the end of the semester. Their scores showed an increase in hostility, a decrease in physical activity and a reduction in the number of pleasurable events. In addition, the data suggested that the exercise students may be able to cope better with such stressful events. However, these conclusions were tentative, and it seemed important to further examine the relationship between stress and physical activity. For a future study, the hypotheses would state that the students felt more stress toward the

end of the semester. In addition, the hypotheses would suggest the Yoga students may feel even more stressed than the exercise students.

Although some of the statistical evidence was tentative, it confirmed the relationship between the subjects' physical and psychological states, which was the underlying assumption of this study. In addition, the results suggested that the students' self-concept -- for example, their perception of themselves as attractive or their global self-satisfaction -- may be affected by physical activity. For a future study, the hypothesis would propose that physical activity benefits students by raising their physical self-concept.

Finally, the empirical assessment of students' initial attitude toward their course suggested significant differences in the students' mind set. It appeared that the Yoga students were commonly motivated by a wish to improve their well-being and reduce stress, and that the exercise students were motivated by other reasons. For a further study, it seemed necessary to explore a connection between the initial reasons for signing up for the course and the students' experience of stress.

F. Limitations

The conclusions of these analyses were limited, for at least six reasons. First, the level of statistical significance for these results must be treated with caution because of a likelihood of Type I error. Most of the results showing the differences between the subject groups were obtained using post-hoc analyses of individual SCL-90R and PSDQ

sub-scales. Together, these two measures contained twenty sub-scales. They were compared a number of times, for example, at the beginning of the semester, at the end, and in relationship to the attitude categories. According to the probability theory, it was likely to find some post-hoc differences among at least three of these comparisons. Second, it may be difficult to attribute any trends in the data to the effect of the PE course alone. Other events toward the end of the semester, such as the approach of the final exams or the arrival of the winter holiday season, may be responsible for the psychological changes. Third, the results apply to a limited population of female undergraduates. Although the analyses initially showed a lack of a significant effect of gender, few males volunteered for the study, resulting in their exclusion from the "pre" and "post" comparisons." Most of the results were drawn on the basis of female student population and, therefore, would apply to female undergraduates. Fourth, the level of experience prior to the study was different between the groups. Most Yoga students were engaged in their discipline for one semester, while the exercise students were already skilled in their exercise programs. Finally, some other, less quantifiable differences existed between groups. For example, the Yoga classes were taught by the same experienced instructor. This instructor had maintained a private practice in the university and private settings. She was known as the teacher of Iyengar technique, which is a particularly rigorous and structured approach to Yoga. In contrast, most exercise classes were conducted by different undergraduate teaching assistants, who varied in their level of experience and enthusiasm.

CHAPTER IV

STUDY TWO

To examine further the psychological effects of Yoga and physical exercise, it was necessary to obtain data that would clarify the limitations of the first study and resolve some of the contradictions in its results. Three areas appeared particularly fruitful. First, it seemed important to explore the students' reasons for selecting their PE course. Second, the empirical data describing the students' experience of stress was contrary to the investigator's impression, based on the discussions with the students. Therefore, it seemed useful to explore the students' subjective experience of stress, especially toward the end of the semester. Third, it seemed useful to further assess the students' view of themselves, focusing on changes in self-perception during the semester and on the role of the course in that process.

To accomplish these multiple goals, the investigator selected a structured interview methodology. The interviews focused on the following hypotheses:

(1) the Yoga students primarily sign up for their course to improve their well-being, whereas the physical exercise students are motivated by other concerns;

(2) students in both groups feel more stressed at the end of the semester; however, Yoga students feel more stressed than the students who attend exercise classes;

(3) the students' self-concepts change as a result of engaging in a physical activity; positive changes in the physical self-concept are related to an improvement in the psychological well-being.

A. Method

1. Subjects

Twenty female undergraduate students from the University of Massachusetts in Amherst participated in the second study. All of the students were volunteers, recruited at the end of a regularly scheduled class session. They composed two separate groups. First, ten of these students attended a Yoga class taught at the Department of Physical Education. These classes included Hatha Yoga I and Hatha Yoga II. All of these classes were taught at an aerobics studio by the same instructor, who is a full-time Yoga teacher in the Amherst community. The university regulations limited the class size to 25 students, and all of the Yoga classes were fully enrolled. Second, ten subjects were enrolled at physical exercise classes at the Department of Physical Education. These classes included aerobics, weight training, karate and volleyball. They were taught at various locations throughout the university gym by student instructors. Each of these classes contained approximately 20 students.

2. Measures

The subjects filled out the same self-report scales as in the first study: the general health questionnaire, the attitude scale, the Physical Self-Description Questionnaire (PSDQ), the Hassles and Uplifts Scale, the Penn State Worry Scale, the Rosenberg Self-Esteem Scale and the Symptom Check-List, 90, Revised. The forms were described in the "measures" section of the first study (see the Appendices A-G).

3. Procedure

The graduate student, who was the main investigator of this project, recruited all subjects within the last two weeks of the Spring 1996 semester by visiting the Yoga and exercise classes. With the consent of the instructor, in the last minutes of the class, the student briefly described the project using the same written instructions as in the first study. If a person volunteered to participate, the investigator handed her a consent form and scheduled a half-hour interview. To counter-balance the effect of the interview, half of the subjects received envelopes with psychological scales before the interview, and the other half received their forms after the interview was completed. Each envelope contained the same set of psychological self-reports as in the first study. As before, the forms were sequenced randomly.

The same investigator administered all the interviews. The subjects were met in the waiting area of the Psychological Services Center, which is a training clinic for the

Psychology Department at the University of Massachusetts in Amherst. They were escorted to the same interview room, where they were again informed about the study, assured of confidentiality and asked for a verbal consent. Also, the investigator asked for a permission to audiotape the session. All subjects gave their consent to be audiotaped, and the tape recorder remained visibly on the table.

The interview closely followed a pre-determined, written outline for each subject. The conversations lasted at least 15 minutes, and no more than 45 minutes. The investigator, at times, used a pen to make brief notes on the margins of the interview form. Finally, at the conclusion of the interview, each subject was thanked for participation, reminded about the self-report questionnaires and, if necessary, handed an envelope with the forms.

Each subject was re-contacted within a week, to be reminded about the agreement to fill out the forms. All the forms were received via the US mail within the next four weeks.

4. Interviews

The interviews followed a structured format. The subjects discussed three topic areas: their expectations from the course, experience of stress and self-perception. Each topic area included three to five main questions. For example, the topic area of "stress" included a question, "What do you do to cope with stress?" In addition, each question was followed by probes which were designed to elicit the subjects' perception of their

behavior. The probes included such questions as, "Who would be the first to know?" and "How could they tell?" The interviewer made few comments besides these pre-determined questions and probes. Occasionally, the interviewer acknowledged the subjects' statements in an encouraging, neutral manner and, if necessary, asked for clarification. At all times, the interviewer made a conscious effort to prevent swaying the subjects' opinions during the discourse and restrained himself from expressing his own attitudes. Later, in writing about her experience of transcribing the audiotapes of these interviews, an undergraduate research assistant said, "The interviewer did succeed in staying unbiased, sticking to the basic form, and not offering any personal input." The outline of these interviews is enclosed in Appendix H.

B. Analysis of the Interview Data

Since this study was conceived as descriptive and exploratory, it was logical to follow the methodology of inductive qualitative analysis. The goal of this analysis was to review the subjects' verbal responses, group them into logical categories, apply statistical procedures and, finally, make an informed judgment about the original hypotheses. Such a procedure would accomplish three broad tasks. First, it would convert subjects' spontaneous responses into empirical data. Second, it would allow an application of statistical procedures to validate the differences between the Yoga and exercise groups. Finally, it would rely on the statistical results to generate informed suggestions about the

relationship between Yoga, exercise and such psychological concepts as "expectations," "stress" and "self-perception."

1. Conversion of Verbal Responses into Data

The following steps were followed in converting the subjects' spontaneous verbal responses into empirical data:

(1) First, two undergraduate assistants received audio tapes of the interviews and copies of the hand-written notes made during the interviews. They used the tapes and the notes to generate written transcripts of the interviews.

(2) The undergraduate assistants and the investigator identified logical items within these transcripts. An "item," or a "response" was defined as a phrase or a short sentence containing a single logical message. These items were entered into a computer spread-sheet.

(3) For each question in the interview, the investigator reviewed the items and, first, copied the items onto a 3x5 card. These cards were physically grouped into small piles of three or four related responses. Then, each group of cards was labeled with a name intended to be simple, descriptive, and in agreement with psychological literature. These labels included names such as "appearance," "health" or "positive emotions." Finally, these initial groups of items (referred to later as "topics") were grouped into broader categories. Again, names were selected for these categories with an intention of being

descriptive and in agreement with psychological literature, such as "physical self-perception" or "emotions." Such broad categories would later be referred to as "themes."

(4) The investigator generated a concise definition for each topic and compiled themes into logical hierarchies. He maintained a separate hierarchy for each interview question. Also, he presented the hierarchies to a research team of five peers and a faculty member. The feedback from this group was used to modify and stream-line the hierarchies.

(5) The investigator used the completed hierarchies to review the items one more time. The definitions for the categories and the topics were used to rate the items. Each item was assigned one number, identifying the theme, and one letter, identifying the topic within that theme. As a result, verbal responses to each question were converted into a matrix of numbers and entered into a computer spread-sheet. The series of responses by one subject was represented by a line in the spread-sheet.

(6) The investigator trained an undergraduate assistant to use the print-out of categories to assign a rating to each item. For each question, they practiced together rating four or five responses. Then, the assistant rated a number of items independently, in the presence of the investigator. Finally, the assistant received a copy of the items and completed the rating independently.

(7) The responses of the undergraduate assistant and the investigator were compared, using the Pearson correlation analysis. All further statistical analyses included only the themes with inter-rater reliability greater than $r=.50$.

2. Statistical Analysis

The empirical data was used to test hypotheses about the effect of belonging to a Yoga or exercise group on the subjects' responses. The data were viewed as a mixed design. There was one between-subject independent variable, representing the group membership, and a number of within-subject independent variables, representing the hierarchy of logical categories.

The following procedure was followed for each question:

(1) For each subject, the number of items within each topic were added up to make that subject's score for that topic.

(2) The data were entered into a table, to show the total number of responses for each question, each category with the question, and each topic within the category. The total scores for the Yoga and exercise students were displayed separately, for comparison.

(3) T-test analysis was used test the following two hypotheses:

(a) for each question, whether the total of responses is different between the Yoga and exercise groups;

(b) for the most popular categories, whether the total of responses is different between the Yoga and exercise groups; only the categories with the minimum of 10 responses were included in such analysis;

(4) The hierarchies of categories were compared for each logical section of the interview -- for example, "expectations" or "stress management." The categories which repeated across a number of questions were grouped together, to represent broad themes.

Such categories included, for example, "cognition" or "overt behavior." Each subject received a score for each broad category, which consisted of a total number of responses within that broad category.

(5) Using the scores for such broad categories, a repeated-measures ANOVA was used to test the following hypotheses:

(a) for each section of the interview, whether membership in an exercise or Yoga group has a significant effect on the number of responses;

(b) for each section of the interview, whether the theme of discourse had a significant effect on the number of responses;

(c) for each section of the interview, whether there is a significant interaction between the theme of discourse and the belonging to an exercise or Yoga group.

(6) Pearson Correlation and Multiple Regression analyses were used to test the link between the broad categories in separate sections of the interview. For example, the correlation analysis was used to evaluate the connection between a student's emphasis on "cognition" in the section describing expectations from the course, and the student's mention of the same theme, "cognition," talking about the change in self-concept.

3. Making Informed Suggestions

The data were used to evaluate the hypotheses stated at the beginning of the study. In addition, the results of the statistical analyses were employed to construct a model illustrating a connection between different topic areas, such as the students' perception of

stress and a change in their self-concept. Because of the small number of subjects and the exploratory methods of analysis, the results were treated as descriptive.

C. Comparison of Subject Groups

Before the interviews were analyzed, it was necessary to establish that the subjects selected for the second study were similar to the subjects of the first study. Repeated-measures ANOVA demonstrated that the subjects were drawn from the same, general undergraduate population. First, examining the SCL-90R scores, the analysis showed that the main effect of the type of study was not significant ($F(1,48)=.07$, $p>.05$). Similarly, the interaction between the type of study and the scores on the SCL-90R sub-scales was not significant ($F(8,384)=.96$, $p>.05$). Second, analysis of the PSDQ scores showed that the main effect of the type of study had a minimal significance ($F(1,43)=.00$, $p>.05$). Similarly, the interaction between the type of study and the scores on the PSDQ sub-scales was not significant ($F(10,430)=.62$, $p>.05$). Third, the analysis of the subjects' scores on the attitude scale showed very little difference between the first and second study ($F(1,49)=.88$, $p>.05$). The pattern of these results strongly suggested that the subjects in both studies exhibited a similar level of psychological symptomatology, had a similar perception about their physical selves and reported a similar attitude about their PE course. Therefore, the interviews conducted during the second study seemed valid for testing the hypotheses that were formulated on the basis of the first study.

CHAPTER V

REASONS AND EXPECTATIONS

The first section of the structured interviews examined the students' reasons and expectations for signing up for their PE courses, both Yoga and exercise. The students were guided through the process of recalling and defining their reasons for selecting the course, comparing the outcome to their original expectations and, finally, evaluating the effects of the course. These questions were based on a hypothesis that the Yoga students primarily signed up for their course to improve their well-being, whereas the physical exercise students were motivated by other concerns.

Each student was asked the following questions:

(1) "Thinking back to the beginning of the semester, why did you sign up for this course?"

This question was intended to start the students' thinking process about their reasons for signing up for a PE course.

(2) "What did you want to change about your life by signing up for this course?"

This question and the following probes were intended to encourage a more personal introspection and, also, define the reasons and expectation in more concrete, behavioral terms.

(3) "Has the course helped you to achieve the original goals?"

This question and the following probes were intended to obtain the students' evaluation of the course effectiveness.

(4) "How do you think the course helped?"

This question was intended to expose the students' perception of the effects of the course their functioning.

A. Question One

The first question stated, "Thinking back to the beginning of the semester, why did you sign up for this course?" The content analysis of this question focused on the students' reasons for selecting a PE course, both Yoga and exercise. Ten Yoga and ten exercise students answered this question. Subjects provided 71 responses, 36 by the Yoga students and 35 by the exercise students. On the average, each student gave 3.5 reasons for selecting a course. Among the Yoga students, six was greatest number of responses and two was the least number of responses. Among the exercise students, six was also the greatest number of responses, and one was the least number of responses.

The content analysis of these responses revealed five broad themes: physical, learning, overt behavior, emotional and external. Each theme was composed of two or three logically related topics. For example, the "physical" category was composed of two topics: "health concerns" and "physical sensations." The definitions of all the categories

are listed in Table 5.1. The number of responses within each category is listed in Table 5.2.

Pearson Correlational Analysis confirmed the reliability of definitions for three categories, "physical," "learning" and "emotional." The inter-rater reliability for these categories ranged from r=.843 to r=.903 (see Table 5.3). Two categories, "overt behavior" (r=.481) and "external" (r=.425) were excluded from further analyses because of low reliability ratings.

Students in the Yoga and exercise groups appeared to provide a similar number of responses for the three valid categories (44 responses overall; 25 items by the Yoga students, 35%; 19 items by the exercise students, 28%). Separate Variance T-test confirmed a lack of significant difference in the number of responses between the two groups ($t=.810$, $df=16$, $p>.05$). Most students provided either two or three reasons for signing up for a PE course.

The majority of responses seemed evenly divided between the three valid categories: physical (11 responses, 15%), learning (13 responses, 18%) and emotional (20 items, 28%). However, the pattern of responses appeared different for the two groups of students. For example, twelve Yoga students (17%) talked about wanting to learn, whereas only one exercise students (1%) talked about this topic. According to Separate Variance T-test analysis, this difference was significant ($t=2.426$, $df=10$, $p<.05$). Similarly, only three Yoga students (4%) talked about their physical self-perception, whereas the exercise students provided eight responses (11%) within that category.

Statistically, according to Separate Variance T-test analysis, this difference was not significant ($t=1.018$, $df=11$, $p>.05$).

Most frequently, the students provided responses that qualified for the "emotional" theme (10 items by the Yoga students, 14%; also, 10 items by the exercise students, 14%). Separate Variance T-test confirmed that the Yoga and exercise students had very similar frequency of responses within this category ($t=.0$, $df=17$, $p>.05$). However, the pattern of responses seemed different for the two subject groups. For the exercise students, the responses were equally divided between the topics of "fun and pleasure" (5 items, 7%) and "negative emotions" (5 items, 7%). In contrast, the Yoga students rarely mentioned fun and pleasure (1 item, 1%). Instead, they most frequently talked about relaxation (5 items, 7%) and their wish to reduce negative emotions (4 items, 6%).

B. Question Two

The second question stated, "What did you want to change about your life by signing up for this course?" This question was followed by three probes, "How would you know if these changes occurred? Who would be the first person to see these changes? What would this person see different about you?"

The content analysis grouped together the responses to these four questions and focused on the students' expectations from the course. Ten Yoga and ten exercise

students responded to these questions. The subjects provided 146 responses, 76 by the Yoga students and 70 by the exercise students. On the average, each student described 7.3 personal changes that they wanted to attain by signing up for a physical education course. Among the Yoga students, twelve was the greatest number of responses and seven was the least number of responses. Among the exercise students, eleven was the greatest number of responses and four was the least number of responses. Two yoga students and five exercise students initially said that they did not want to make any substantial changes but, after a short delay, elaborated and supplied some details.

Content analysis of these responses revealed eight broad themes: relationships, learning and knowledge, external reasons, cognitive patterns, physical self-perception, overt behavior, feelings and emotions, and "no change." Each theme was composed of up to four logically related topics. For example, the "relationships" category was composed of two topics: "interpersonal behavior" and "interpersonal comfort." The definitions of all the categories are listed in Table 5.4. The number of responses within each category is listed in Table 5.5.

Pearson Correlation Analysis confirmed the reliability of all categories, except "learning and knowledge." The inter-rater reliability ranged from r=.793 to r=.968 (see Table 5.6). The "learning and knowledge" category (r=.349) was excluded from further analyses.

Students in the Yoga and exercise groups appeared to provide a similar number of responses for the seven valid categories (139 responses overall; 73 items by the Yoga

students, 50%; 66 items by the exercise students, 45%). Separate Variance T-test confirmed a lack of significant difference in the number of responses between the two groups ($t=0.626$, $df=18$, $p>.05$). However, it seemed that the theme of the discourse had a significant effect on the number of responses. For example, talking about external reasons --such as extra credit or money -- for selecting a course, the students provided only three responses (2%). In contrast, the "physical self-perception" category included 44 items (30%). In addition, the pattern of responses appeared different for the two groups of students. For example, the "physical self-perception" responses were supplied almost twice as often by the exercise students as by the yoga students (29 v. 15 responses). Similarly, the yoga students mentioned changes to their feelings and emotions twice as often as the exercise students (19 v. 9 responses).

"Physical self-perception" was the most frequently mentioned category (44 responses; 15 items by the Yoga students, 10%; 29 items by the exercise students, 20%). Separate Variance T-test indicated that the difference in the frequency of responses by the Yoga and exercise students was not significant ($t=1.282$, $df=16$, $p>.05$). Within this category, the topic of discourse appeared to affect the number of responses. The students most often mentioned their physical ability (19 responses, 13%). They wanted, for example, to become more flexible, stronger and more competitive. In contrast, the students mentioned the topic of health only six times (4%). Also, it seemed that belonging to a Yoga or exercise class had a significant effect on the pattern of responses.

For example, the exercise students talked about their physical ability five times more often than the Yoga students (16 v. 3 responses).

"Feelings and emotions" was the second most frequently mentioned category (28 responses; 19 items by the Yoga students, 13%; 9 items by the exercise students, 6%). Separate Variance T-test indicated that the difference in the frequency of responses by the Yoga and exercise students was not significant ($t=1.504$, $df=17$, $p>.05$). It seemed that belonging to a Yoga or exercise class had a significant effect on the pattern of responses. Overall, the students talked most often about their "negative emotions" (12 responses; 9 items by the Yoga students, 6%; 3 items by the exercise students, 2%). The students described, for example, wanting to feel less anxiety, sadness and stress. In other topics, the Yoga students mentioned relaxation eight times (5%), whereas the exercise students never talked about wanting to relax. In contrast, the exercise students talked more often about fun and pleasure (6 v. 2 items).

Third, the students talked about their "cognitive patterns" (25 responses; 20 items by the Yoga students, 14%; 5 items by the exercise students, 3%). Separate Variance T-test showed a significant difference in the number of responses by the Yoga and exercise students ($t=3.00$, $df=13$, $p<.05$). Indeed, the most common topic, "mind/body attitude," was mentioned only by the Yoga students (9 items, 6%). In contrast, the exercise students talked only about their attitude toward self and others (5 items, 3%). The Yoga students also provided some responses to that topic (4 items, 3%).

C. Question Three

The third question stated, "Has the course helped you to achieve the original goals?" The interviewer elaborated on this question by quoting the goals that the subject provided earlier. Also, this question was followed by a probe, "What recent events in your life make you think that you have achieved some of these goals?"

The content analysis of the main question focused on the students' evaluation of the degree to which the course fulfilled their expectations. Ten Yoga and ten exercise students responded to this question. All the students (100%) responded positively. Seven students (35%) elaborated by saying "yes, definitely" or "yes, absolutely" (5 Yoga students, 25%, and 2 exercise students, 10%). One exercise student (5%) qualified her response by saying "conditioning, yes; endurance, no."

The analysis of the probe provided more concrete definitions of the changes caused by the PE course. Ten Yoga and ten exercise students responded to the probe, listing 24 examples that demonstrated the course effectiveness (12 by the Yoga and 12 by the exercise students). On the average, each student provided 1.2 examples. Among the Yoga students, two subjects described two situations, and everybody provided at least one example. Similarly, among the exercise students, two subjects described two situations, and everybody provided at least one example.

The content analysis showed that the students described four types of events: "class-related," "daily routine," "occupation" and "crises." For example, an event was

judged to relate to the "crises" category if the student felt the effects of course while encountering one of the following situations: a problem with the law, a traumatic interpersonal event or a crisis at work or school. The definitions of all categories are listed in Table 5.7. The number of responses within each category is listed in Table 5.8.

Pearson Correlational Analysis confirmed the reliability for all categories. The inter-rater reliability ranged from r=.576 to r=1.00 (see Table 5.9). All categories were included in further analyses.

Students in the Yoga and exercise groups provided an equal number of responses the probe (20 responses overall; 10 items by the Yoga students, 50%; 10 items by the exercise students, 50%). Separate Variance T-test confirmed a lack of significant difference in the number of responses between the two groups ($t=0.00$, $df=18$, $p>.05$). Also, , the pattern of responses appeared similar for the two groups of students. For both groups, the students most frequently talked about their daily tasks, and they provided an equal number of items for this category (5 responses by the Yoga students, 21%; 5 responses by the exercise students, 21%). There were some differences in other categories, such as "crises" (3 responses by the Yoga students and none by the exercise students). However, the low number of responses to these topics did not allow more positive conclusions.

D. Question Four

The fourth question stated, "How do you think the course helped?" This question evaluated the students' perception of the effects of the course on their functioning. Ten Yoga and ten exercise students responded to this question. Subjects provided 69 responses, 47 by the Yoga students and 22 by the exercise students. On the average, each student made 3.5 brief answers. Among the Yoga students, nine was the most number of responses; one Yoga student was unable to make any comment. Among the exercise students, five was the most number of responses; two exercise students responded by saying "do not know."

Content analysis of these responses revealed seven broad themes: cognition/thinking pattern, daily behavior, learning process, exercise and practice, physical self perception, feelings and emotions, and "no help." Each theme was composed of a number of logically related topics. For example, the category of "cognition/thinking pattern" was composed of four topics: focus and concentrate, attitude, awareness and self-esteem. The definitions of all categories are listed in Table 5.10. The number of responses within each category is listed in Table 5.11.

Pearson Correlational Analysis confirmed the reliability of all categories. The inter-rater reliability ranged from r=.604 to r=.932 (see Table 5.12). All categories were included in further analyses.

The Yoga students appeared to provide a consistently greater number of responses (47 by the Yoga students, 73%; 22 by the exercise students, 27%). Separate Variance T-test confirmed the significance of the difference in the number of items between the two groups ($t=2.801$, $df=14$, $p<.05$). On the average, each Yoga student supplied 4.7 responses, and each exercise student supplied 2.2 responses.

"Cognition/thinking pattern" was the most frequently mentioned category. Students provided 25 responses which related to that theme (36% of the total). The Yoga students seemed to talk more frequently about their cognition and thinking than the exercise students. They provided 21 responses (30%), and the exercise students provided only 4 responses (6%). Separate Variance T-test confirmed a significant difference between the two subject groups ($t=2.396$, $df=13$, $p<.05$). The yoga students most often said that the course helped by increasing their awareness (13 items, 19%). In contrast, the exercise students did not mention any topic, except "self-esteem" (4 items, 6%).

"Learning process" was another frequently mentioned category (11 responses, 16%). Only the Yoga students provided responses that qualified for this theme. They most frequently mentioned that they benefited by learning the technique, such as breathing techniques and Yogic postures (7 items, 10%). The students also mentioned three times (4%) that they were affected by observing and listening to the teacher.

There were other difference in the pattern of responses, between the Yoga and exercise groups. Among the exercise group, the most frequently mentioned category was "exercise and practice." The exercise students said six times (9%) that they benefited

from practicing the exercises and exerting their bodies. Only one yoga student (1%) also said that the practice was beneficial. Also, the exercise students stated five times (7%) that the course was not helpful. For example, they said that the changes in their lives occurred for other reasons, or that the course was not sufficiently intense. Only one yoga student provided a single response (1%) which was interpreted as "no comment."

Table 5.1. Hierarchy of categories: Thinking back to the beginning of the semester, why did you sign up for this course?

1		PHYSICAL	
	A	Health Concerns	
			resolve physical difficulties (hip pain, migraines, etc)
	B	Physical Sensations	
			improve the way the body feels (strength, flexibility, etc)
2		LEARNING	
	A	Philosophical Questions	
			learn about Eastern religions, holistic attitude toward the mind and the body, spirituality, etc.
	B	Knowledge	
			learn more satisfy curiosity receive additional guidance and instructions
	C	Skills	
			learn a new skill (mental of physical)
3		OVERT BEHAVIOR	
	A	Behavior Change	
			act differently in daily life (e.g. act more motivated toward school, follow a different diet, exercise regularly)
	B	Practice	
			continue practicing existing skills extend experience that was beneficial in the past
	C	Exercise	
			use the class time to engage in exercise experience a particular sensation unique to exercise (e.g. "achieve goals in weight lifting"; "challenge")
4		EMOTIONAL	
	A	Fun/Pleasure	
			experience fun and pleasure

Continued, next page.

Table 5.1. Continued.

4	B	Negative Emotions	
			reduce the frequency of negative emotions elevate self-esteem reduce stress
	C	Relaxation	
			learn to be more relaxed
5		EXTERNAL	
	A	Others' Recommendation	
			after contacting another person, believe that this class would be helpful
	B	Logistics	
			easy credit convenient for schedule
	C	School	
			class would help with school work

Table 5.2. Rating of Responses: Thinking back to the beginning of the semester, why did you sign up for this course?

		Category	Yoga	Exercise	Total
		<All responses>	36	35	71
1		PHYSICAL	3	8	11
	A	Health Concerns	1	2	3
	B	Physical Sensations	2	6	8
2		LEARNING	12	1	13
	A	Philosophical Questions	4	0	4
	B	Knowledge	6	1	7
	C	Skills	2	0	2
3		OVERT BEHAVIOR	5	12	17
	A	Behavior Change	1	6	7
	B	Practice	4	2	6
	C	Exercise	0	4	4
4		EMOTIONAL	10	10	20
	A	Fun/Pleasure	1	5	6
	B	Negative Emotions	4	5	9
	C	Relaxation	5	0	5
5		EXTERNAL	6	4	10
	A	Others' Recommendation	3	1	4
	B	Logistics	0	3	3
	C	School	3	0	3

Table 5.3. Inter-Rater Reliability: Thinking back to the beginning of the semester, why did you sign up for this course?

Rater 1 Rater 2	Physical	Learning	Overt Behavior	Emotional	External
Physical	.843**	-.087	.112	-.310	.005
Learning	-.110	.902**	.148	-.206	.014
Overt Behavior	.034	-.016	.481*	-.028	-.09
Emotional	.098	-.232	-.049	.903**	-.503*
External	-.330	-.196	-.327	.038	.425

* = $p < .05$

** = $p < .001$

Table 5.4. Hierarchy of categories: What did you want to change about your life by signing up for this course?

1		RELATIONSHI PS	
	A	Interpersonal Behavior	
			resolve conflicts improve communications skills talk better with others make someone smile learn leadership skills
	B	Interpersonal Comfort	
			feel acknowledged by others smile at others
2		LEARNING AND KNOWLEDGE	
			learn more facts learn a new physical activity learn about philosophy
3		EXTERNAL REASONS	
			get a job save money get easy credits get high grades arrange a convenient schedule
4		COGNITIVE PATTERNS	
	A	Attention to Environment	
			care about physical things pay attention to physical surroundings
	B	Mind/Body Attitude	
			pay attention to own physical body be aware of physical body (physical self-awareness)

Continued, next page.

Table 5.4. Continued.

	C	Cognitive Skills	
			able to focus or concentrate better adopt more efficient problem-solving strategies
	D	Attitude toward Self and Others	
			think differently about the self think differently about the world and other people change self-image or body image appreciate differently self, others and the world
5		PHYSICAL SELF-PERCEPTION	
	A	Physical Attributes	
			change physical characteristics, such as posture, weight change appearance fit into clothes differently
	B	Physical Ability	
			change a level of physical ability, such as flexibility, strength or endurance become more competitive complete the same task in less time
	C	Health	
			reduce the incidence of illness be rid of aches and pains
	D	General Well-Being	
			raise the general sense of energy raise muscle tone feel good physically
6		OVERT BEHAVIOR	
	A	Self-Control	
			set and achieve measurable goals reduce lethargy and procrastination act according to pre-determined guidelines discipline
	B	Life Style	
			change the frequency of partying, drinking coffee and alcohol change diet engage in a regular exercise routine

Continued, next page.

Table 5.4. Continued.

	C	Level of Exertion	
			change level of physical activity reduce the number of work commitments feel and act more "laid back"
7		FEELINGS AND EMOTIONS	
	A	Positive Emotions	
			have fun enjoy things feel happy
	B	Negative Emotions	
			reduce rate of anxiety, sadness and nervousness reduce the feeling of stress
	C	Relaxation	
			feel more relaxed

Table 5.5. Rating of Responses: What did you want to change about your life by signing up for this course?

		Category	Yoga	Exercise	Total
		<all responses>	76	70	146
1		RELATIONSHIPS	6	4	10
	A	Interpersonal Behavior	4	2	8
	B	Interpersonal Comfort		2	2
2		LEARNING AND KNOWLEDGE	3	4	7
3		EXTERNAL REASONS	0	3	3
4		COGNITIVE PATTERNS	20	5	25
	A	Attention to Environment			0
	B	Mind/Body Attitude	9		9
	C	Cognitive Skills	7		7
	D	Attitude toward Self and Others	4	5	5
5		PHYSICAL SELF-PERCEPTION	15	29	44
	A	Physical Attributes	2	4	6
	B	Physical Ability	3	16	19
	C	Health	3	3	6
	D	General Well-Being	7	6	13
6		OVERT BEHAVIOR	11	11	22
	A	Self-Control	3	6	9
	B	Life Style	3	4	7
	C	Level of Exertion	5	1	6
7		FEELINGS AND EMOTIONS	19	9	28
	A	Positive Emotions	2	6	8
	B	Negative Emotions	9	3	12
	C	Relaxation	8		8
8		NO CHANGE	2	5	7

Table 5.6. Inter-Rater Reliability: What did you want to change about your life by signing up for this course?

Rater 1 Rater 2	Relation.	Learning and Knowledge	External Reasons	Cognitive Patterns
Relationships	.891**	.465*	.413	.072
Learning and Knowledge	.134	.349	.379	.058
External Reasons	.503*	.490*	.793**	-.256
Cognitive Patterns	.099	.00	-.064	.802**
Physical Self-Perception	-.191	.114	-.165	-.431
Overt Behavior	-.197	-.048	.128	.116
Feelings and Emotions	-.069	-.050	-.200	.297

Rater 1 Rater 2	Physical Self-Perception	Overt Behavior	Feelings and Emotions
Relationships	-.277	-.161	.075
Learning and Knowledge	-.219	.294	-.271
External Reasons	-.057	-.109	-.247
Cognitive Patterns	-.370	.235	.526*
Physical Self-Perception	.968**	-.327	-.379
Overt Behavior	-.106	.861**	.012
Feelings and Emotions	-.452*	.054	.905**

* = $p < .05$

** = $p < .001$

Table 5.7. Hierarchy of Categories: What recent events in your life make you think that you have achieved some of these goals?

1	Class-Related Events	
		during class, or immediately after class
2	Daily Routine	
		daily tasks events that happen without premeditation or scheduling (e.g. smoking a cigarette, making an effort to stay healthy) interpersonal situations during eating and meal times, or during play time
3	Occupation	
		work, or school
4	Crises	
		problems with the law traumatic interpersonal events crises at work or school

Table 5.8. Rating of Responses: What recent events in your life make you think that you have achieved some of these goals?

		Yoga	Exercise	Total
	<all responses>	12	12	24
1	Class-Related Events	1	5	6
2	Daily Routine	5	5	10
3	Occupation	3	2	5
4	Crises	3	0	3

Table 5.9. Inter-rater Reliability: What recent events in your life make you think that you have achieved some of these goals?

Rater 1 Rater 2	Class-Related Events	Daily Routine	Occupation	Crises
Class-Related Events	.576*	-.251	-.452	-.273
Daily Routine	-.174	.577*	-.00	-.174
Occupation	-.026	.043*	.861**	-.389
Crises	-.273	-.251	-.101	1.00**

* = $p < .05$

** = $p < .001$

Table 5.10. Hierarchy of Categories: How Do You Think the Course Helped?

1		COGNITION/ THINKING PATTERN	
	A	Focus and Concentrate	able to re-focus able to concentrate on one certain type of events, as opposed to another
	B	Attitude	pay attention to self more than to the external environment value and appreciate things differently
	C	Awareness	pay attention to internal processes, such as physical sensations or emotions
	D	Self-esteem	believe that able to accomplish greater things, than in the past believe that can change personal traits believe that can improve physical body
2		DAILY BEHAVIOR	
	A	Diet	change diet or eating habits start eating healthier
	B	Timing and Scheduling	change daily routine set aside time for a different kind of activities than in the past
3		LEARNING PROCESS	
	A	Teacher/ modeling	feel affected by teacher's behavior learn from explanations
	B	Techniques	benefit from specific techniques presented in the class (for example, breathing techniques or yogic postures)
	C	Philosophy	learn about holistic philosophy answer philosophical questions about life
4		EXERCISE AND PRACTICE	
	A	Practice	feel affected by the process of engaging in the exercise routine work out in daily life, practice postures and breathing techniques
	B	Exertion	get the heart rate up work muscles to exertion

Continued, next page.

Table 5.10. Continued.

5		PHYSICAL SELF-PERCEPTION	
	A	Appearance	feel that some aspect of personal appearance has been improved
	B	Ability	feel stronger, more flexible, more capable physically
	C	Health	feel reduction in physical health problems feel less physical pain
6		FEELINGS AND EMOTIONS	
	A	Positive emotions	have fun, enjoy the class feel better about self
	B	Negative emotions	experience less negative emotions feel less stress
	C	Relaxation	feel more relaxed
7		NO HELP	
	A	Other events	change occurred as a result of events outside of the class
	B	Not enough	course was unable to help because classes were not sufficiently intense, demanding or frequent
	C	No response	no comment cannot say how the course helped do not know how the course was able to help

Table 5.11. Rating of Responses: How Do You Think the Course Helped?

		Categories			
		<all responses>	Yoga	Exercise	Total
			47	22	69
1		COGNITION/ THINKING PATTERN	21	4	25
	A	Focus and Concentrate	3		3
	B	Attitude	5		5
	C	Awareness	13		13
	D	Self-esteem		4	4
2		DAILY BEHAVIOR	5	0	5
	A	Diet	1		1
	B	Timing and Scheduling	4		4
3		LEARNING PROCESS	11	0	11
	A	Teacher/ modeling	3		3
	B	Techniques	7		7
	C	Philosophy	1		1
4		EXERCISE AND PRACTICE	1	6	7
	A	Practice	1	3	4
	B	Exertion		3	3
5		PHYSICAL SELF-PERCEPTION	5	3	8
	A	Appearance	1		1
	B	Ability	3	3	6
	C	Health	1		1
6		FEELINGS AND EMOTIONS	3	4	7
	A	Positive emotions	2	3	5
	B	Negative emotions		1	1
	C	Relaxation	1		1
7		NO HELP	1	5	6
	A	Other events		1	1
	B	Not enough		2	2
	C	No response	1	3	5

Table 5.12. Inter-Rater Reliability: How Do You Think the Course Helped?

Rater 1 Rater 2	Cognition	Daily Behavior	Learning Process	Exercise and Practice
Cognition	.916**	.211	.228	-.320
Daily Behavior	.572*	.604*	.061	-.241
Learning Process	.446	-.218	.849**	-.281
Exercise and Practice	-.386	-.274	-.062	.925**
Physical Self-Perception	.006	.628*	-.054	-.029
Feelings and Emotions	-.261	-.023	.105	.169
No Help	-.115	.013	-.295	-.310

Rater 1 Rater 2	Physical Self-Perception	Feelings and Emotions	No Help
Cognition	.071	-.169	-.193
Daily Behavior	.142	-.064	-.259
Learning Process	-.149	.323	-.301
Exercise and Practice	.127	-.145	-.379
Physical Self-Perception	.851**	-.127	-.151
Feelings and Emotions	-.206	.676**	-.151
No Help	.059	-.397	.932**

* = $p < .05$

** = $p < .001$

CHAPTER VI

PERCEPTION AND MANAGEMENT OF STRESS

The second section of the structured interviews focused on the students' perception of stress. In this section, the interviewer asked four sets of questions about the students' subjective experience of stress, their familiarity with stress coping skills, and their perception of the effectiveness of such skills. These questions were based on the hypothesis that all students would feel more stressed at the end of the semester, and that the Yoga students would feel even more stressed than the students who attended the exercise classes.

Each student was asked the following sets of questions:

(1) "We will now switch to a different topic. . . Are there times when you feel stressed?"

This questions and the subsequent probes encouraged the students to start thinking about stress and about their individual perception of stress.

(2) "How can people around you tell that you are stressed?"

This questions and the subsequent probes were intended to obtain a description of the students' overt expression of stress, as well as of their inner, subjective experience.

(3) "What do you do to cope with stress?"

This questions and the subsequent probes were intended to expose the students' working knowledge of stress management skills.

(4) "In what ways, if any, did taking the course help you manage your stress?"

This questions and the subsequent probes were intended to obtain the students' evaluation of the course effectiveness in managing stress. Also, the questions asked about the change to the students' overt behavior, as well as their inner experience.

A. Question One

The first question stated, "Are there times when you feel stressed?" This question was followed by two probes, "What specifically do you feel stressed about today?" and, "Are there times during the course of the semester when you feel more stress than at other times?"

The content analysis of the main question focused on the subjects' level of assessment about their experience of stress. All 20 subjects agreed that they at times experience stress. The responses were then judged on a two-point scale, "agree" and "definitely agree." A response was assigned to the "definitely agree" category if a student said "definitely" or "absolutely," or if a student provided more than one example of feeling stressed. These responses are summarized in Table 6.1.

Results of a Pearson Chi-Square analysis indicated that the pattern of responses was very similar for both the Yoga and the exercise groups (X^2=.833, df=1, p>.05). Among the Yoga students, five subjects expressed agreement (25%), and five subjects expressed definite agreement (25%). Likewise, among the exercise students, seven

subjects (35%) said that they agreed, and three subjects (15%) said that they definitely agreed.

For the first probe, analysis focused on the students' perception of the external stimuli for stress. Data included responses from eighteen subjects, ten from the exercise group and eight from the Yoga group. Two Yoga students were excluded either because they could not provide specific examples, or because the responses were vague and difficult to interpret. For example, one such student said, in a joking manner, that stress makes her "want to clean her room." Then, she elaborated, "Nothing stressful today." The remaining eighteen students provided 44 examples of the situations that caused them stress on the day of the interview (16 by the Yoga students and 28 by the exercise students). On the average, each student gave 2.4 examples of stressful situations. Among the Yoga students, three was the greatest number of responses, given by three different subjects, and one subject failed to provide any specific examples. Among the exercise students, seven was the greatest number of responses, given by a single subject, and one was the least number of responses, given twice.

Content analysis of these responses revealed four broad themes: daily routine, occupation/school, future concerns and "nothing." Each theme was composed of three or four logically related topics. For example, the theme "daily routine" included four sub-topics: daily tasks, interpersonal situations, eating and logistical support. The definitions of all categories are listed in Table 6.2. The number of responses within each category are summarized in Table 6.3.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability ranged from .876 to 1.00 (see Table 6.4). All the categories were included in further analyses.

Students in the exercise groups appeared to cite almost twice as many stressful situations as the Yoga students (16 items by the Yoga students, 36%; 28 items by the exercise students, 64%). However, Separate Variance T-test showed that the difference was not significant ($t=1.212$, $df=14$, $p>.05$).

For both groups, the category "occupation/school" included the greatest number of responses (22 responses, 50%; 7 items by the Yoga students, 16%, and 15 items by the exercise students, 34%). For example, the students talked about the challenge of completing a thesis, or the pressure of performing well at a number of tests. Again, the exercise students provided approximately twice as many examples as the Yoga students. However, Separate Variance T-test showed that the difference was not significant ($t=1.183$, $df=13$, $p>.05$).

The students in both groups talked about their future concerns (11 items; 4 responses by the Yoga students, 9%, and 7 responses by the exercise students, 16%). Within this theme, students most often described the topic of "milestones and lifestyle change," such as the approaching graduation and the choice of career (7 items, 16%). Separate Variance T-test confirmed that the difference between the groups was not significant ($t=1.183$, $df=13$, $p>.05$).

For the second probe, analysis examined the students' perception of the time period when they feel the most stress. Ten Yoga and ten exercise students answered this

question. Subjects provided 39 responses, 17 by the Yoga students and 19 by the exercise students. On the average, each student gave 2.0 examples of stressful situations. Among the Yoga students, three was the greatest number of responses, given by two subjects; one was the least number of responses, given three times. Among the exercise students, three was also the greatest number of responses, given by a single subject; one was the least number of responses, given four times.

Content analysis of these responses revealed three broad themes: chronological calendar, school events and "no specific times." Each theme was composed of up to four logically related topics. For example, the "chronological calendar" category was composed of four topics: beginning of the semester, middle of the semester, end of the semester and calendar event unrelated to school. The definition of all the categories, and the summary of responses are listed in Table 6.5.

Pearson Correlation Analysis confirmed the high reliability of definitions for all categories. The inter-rater reliability ranged from r=.929 to r=1.00 (see Table 6.6).

Students in both groups appeared to give a similar number of responses (17 items by the Yoga students, 47%; 19 items by the exercise students, 53%). Separate Variance T-test confirmed that the difference between the groups was not significant (t=.632, df=18, p>.05).

The majority of responses were evenly divided between the two categories: "chronological calendar" (16 responses, 44%) and "school events" (18 responses, 50%). The subjects in both groups provided a similar number of responses for these categories: the Yoga students specified chronological time 7 times (19%) and a period in the

semester 9 times (25%); similarly the exercise students specified chronological time 9 times (25%) and a period in the semester also 9 times (25%). Separate Variance T-test confirmed that the difference between these numbers was not significant ($t=.572$, $df=17$, $p>.05$; and $t=.00$, $df=18$, $p>.05$).

For all categories, students most often talked about the time related to the end of the semester. For example, they specifically said, "end of the semester," or else they mentioned "finals" or "deadlines." Overall, students provided 27 responses saying that the most stressful time during the semester was during the final exams (14 by the Yoga students, 39%, and 13 by the exercise students, 36%). There were 7 responses that described all the other times during the semester (19%). Bonferroni T-test analysis was used to examine the difference between the responses related to the time of the final exams, and responses related to other times during the semester. The difference between the "finals" and "other" responses was significant ($t=6.892$, $df=19$, Bonferroni adjusted $p<.001$).

B. Question Two

The second question stated, "How can people around you tell that you are stressed?" This question was followed by a single probe, "How can you tell?"

For the main question, analysis focused on the students' perception of their behavioral manifestation of stress. Ten Yoga and ten exercise subjects answered this question. The subjects provided 76 responses, 29 by the Yoga students and 47 by the

exercise students. On the average, students gave 3.8 examples of exhibiting stress to others. Among the Yoga students, five was the greatest number of responses, given by one student, and one was the least number of responses, given twice. Among the exercise students, seven was the greatest number of responses, given by one student, and two was the least number of responses, given once.

Content analysis of these responses revealed five broad themes: relationships, cognitive patterns, physiological response, feelings and emotions and "none." Each theme was composed of a maximum of three logically related topics. For example, the "relationships" category was composed of three topics: communication style, interpersonal contact and interpersonal skills. The definitions of all categories are listed in Table 6.7. The number of responses within each category is listed in Table 6.8.

Pearson Correlation Analysis confirmed the reliability of definitions for all five categories. The inter-rater reliability for these categories ranged from r=.809 to r=.970 (see Table 6.9).

The students in the Yoga group provided fewer responses (29 items by the Yoga students, 38%; 47 items by the exercise students, 62%). Separate Variance T-test confirmed that the difference between the groups was significant ($t=3.067$, $df=18$, $p<.01$). This pattern was consistent: the Yoga students responded less frequently to three out of five categories.

The category of "relationships" was mentioned most frequently by both groups (12 responses by the Yoga group, 16%; 25 responses by the exercise group, 33%). Here also, the exercise students provided twice as many items within this category (25 v. 12).

Separate Variance T-test confirmed that the difference between these numbers was significant ($t=2.327$, $df=18$, $p<.05$). Within this category, "communication style" was the most frequently mentioned topic (5 responses by the Yoga group, 7%; 13 responses by the exercise group, 17%). The topic of "interpersonal contact" was almost as common (7 responses by the Yoga group, 9%; 8 responses by the exercise group, 11%). For example, students described answering people more abruptly, or becoming more shy.

In addition, students provided 66 items to the probe, "How can you tell?" (32 by the Yoga students and 34 by the exercise students). These responses showed the students' understanding of their internal signs of stress. Ten Yoga and ten exercise subjects answered this question. On the average, students gave 3.3 examples of their subjective signs of stress. Among the Yoga students, two was the least number of responses, given four times, and five was the highest number of responses, given twice. Among the exercise students, one was the least number of responses, supplied twice, and six was the highest number of responses, supplied once.

Content analysis revealed six broad themes, similar to the categories describing the main question: relationships, cognitive patterns, physiological response, feelings and emotions, overt behavior and "none." Each theme was composed of a maximum of four logically related topics. For example, the new category of "overt behavior" was composed of three topics: food preference, change in schedule and ritualistic behavior. The definitions of all categories are listed in Table 6.10. The number of responses within each category is listed in Table 6.11.

Pearson Correlation Analysis confirmed the high reliability of definitions for all six categories. The inter-rater reliability for these categories ranged from r=.969 to r=1.00 (see Table 6.12).

Students in the two groups provided a similar number of responses (32 items by the Yoga students, 48%; 34 items by the exercise students, 52%). Separate Variance T-test confirmed that the difference between the groups was not significant (t=.293, df=16, p>.05). However, there seemed some difference in the pattern of responses. The Yoga students talked most often about their "physiological response" (18 items, 28%), whereas the exercise students most often mentioned their "overt behavior" (11 items, 17%). Also, unlike the previous question, the students gave only five responses to the category "relationships" (8%).

Most often, the students talked about feeling their physiological response to stress (25 responses, 38%; 18 items by the Yoga students, 17%; 7 items by the exercise students, 11%). For example, the students mentioned a change in their sleeping pattern, or a drop in the general energy level. The Yoga students provided almost twice as many responses as the exercise students. Separate Variance T-test suggested that the difference between the groups approached significance (t=2.058, df=14, p<.06).

Students also often talked about noticing their own overt behavior (13 responses, 38%; 2 items by the Yoga students, 3%; 11 items by the exercise students, 17%). For example, the students mentioned drinking more coffee, or spending less time exercising. Here, the exercise students appeared to provide five times as many responses as the Yoga students.

Because students' responses to the first question and to the subsequent probe formed such similar hierarchies of categories, it was possible to compare these two sets of responses. Repeated-measures ANOVA was used to compare four categories: relationships, cognitive patterns, physiological response and feelings and emotions. Analysis suggested that the type of question significantly affected the number of responses ($F(1,18)=5.959$, $p<.05$). Also, there was a significant interaction between the type of question and the type of students ($F(1,18)=5.007$, $p<.05$). Indeed, the Yoga students said twelve times that others notice their stress by their behavior in relationships; the Yoga students never mentioned that they notice their own stress by a change in relationships. In contrast, the exercise students talked about relationships in response to both the main question (25 items) and the probe (5 items). Bonferroni t-test analysis confirmed that there was a significant difference in the number of responses to the category "relationships" ($t=4.883$, $p<.001$). For the other three categories, the difference was not significant.

C. Question Three

The third question stated, "What do you do to cope with stress?" This question was followed by a probe: "If these strategies do not work, what else can you do?"

The responses to these questions were combined to show the students' working knowledge of their stress management skills. Ten Yoga and ten exercise subjects answered this question. The subjects provided 108 responses, 51 by the Yoga students

and 57 by the exercise students. On the average, each student described 5.4 examples of stress management skills. Among the Yoga students, seven was the greatest number of responses, given once, and four was the least number of responses, given twice. Among the exercise students, eight was the greatest number of responses, supplied once, and two was the least number of responses, also supplied once.

Content analysis of these responses revealed six broad themes: distraction, cognitive change, interpersonal support, goal-oriented activity, physical activity and "nothing." Each theme was composed of up to three logically related topics. For example, the "distraction" category was composed of three topics: "pleasurable activity," "intellectual activity" and "sensory distraction." The definitions of all the categories are listed in Table 6.13. The number of responses within each category is listed in Table 6.14.

Pearson Correlation Analysis confirmed the high reliability of all categories. The inter-rater reliability ranged from $r=.882$ to $r=1.00$ (see Table 6.15).

Students in the Yoga and exercise groups provided a similar number of responses (51 items by the Yoga students, 47%; 57 items by the exercise students, 53%). Separate Variance T-test confirmed that the difference between the groups was not significant ($t=.962$, $df=13$, $p>.05$).

Students mentioned most frequently three categories: "distraction" (25 items; 12 responses by the Yoga group, 11%; 13 responses by the exercise group, 12%); "goal-oriented activity" (23 items; 7 responses by the Yoga group, 6%; 16 responses by the exercise group, 15%); and "physical activity" (27 items; 16 responses by the Yoga group,

15%; 11 responses by the exercise group, 10%). For example, students mentioned distracting themselves through pleasurable activities, such as going to a party, or through sensory experiences, such as eating. Talking about goal-oriented activities, students said that they managed stress by focusing on studying, or by using relaxation techniques. Not surprising, the subjects most often said that they manage stress by exercising, such as walking, jogging or doing Yoga. Consistently, the Yoga and exercise students provided similar number of responses for these three categories. Separate Variance T-test confirmed that there was no significant difference in the responses by the two groups ("distraction": $t=.187$, $df=17$, $p>.05$; "goal-oriented activity": $t=1.659$, $df=16$, $p>.05$; "physical activity": $t=1.213$, $df=13$, $p>.05$).

D. Question Four

The fourth question stated, "In what ways, if any, did taking the course help you manage your stress?" This question was followed by two probes: "How can people around you tell if the course is effective? How can you tell?"

The main question showed whether the subjects found their PE course helpful in managing stress. Nine Yoga and ten exercise subjects answered this question. For each student, the answer was judged as "very helpful," "helpful," "not certain" or "negative effect" (these categories and the students' responses are summarized in Table 6.16).

Pearson Correlation Analysis confirmed the reliability of all categories, except "not certain." Only one subject's response was rated as "not certain," and only by one of

the two raters; that category was excluded from further analyses.. The inter-rater reliability for the remaining responses ranged from r=.686 to r=1.00 (see Table 6.17).

The majority of the subjects found the course very helpful (13 students, 72%), but the Yoga students' assessment seems more positive. The items supplied by all Yoga subjects were rated "very helpful" (8 students, 44%). In contrast, the ten exercise students described their course more evenly: five responses were rated as "very helpful" (28%), three responses were rated as "helpful" (17%), and the remaining two responses were rated "negative effect" (11%). Although the small number of subjects limits the value of the Pearson Chi-Square analysis, its results suggested that the difference between the two groups approached significance (X^2=5.538, df=2, p<.06).

The first probe, "how can people around you tell if the course is effective," highlighted the students' understanding of the behavioral changes caused by the course. Ten Yoga and seven exercise subjects answered this question. The subjects provided 42 responses, 23 by the Yoga students and 19 by the exercise students. On the average, students gave 2.5 examples. Among the Yoga students, four was the greatest number of responses, given by two students, and one was the least number of responses, given four times. Among the exercise students, six was the greatest number of responses, given by one student, and one was the least number of responses, given twice.

Content analysis of these responses revealed seven broad themes: relationships, cognitive patterns, physical self-perception, daily behavior, exercise and practice, feelings and emotions and "none." Each theme was composed of a maximum of three logically related topics. For example, the "cognition/thinking patterns" category was composed of

three topics: attitude, awareness and strategy. The definitions of all categories are listed in Table 6.18. The number of responses within each category is listed in Table 6.19.

Pearson Correlation Analysis confirmed the reliability of definitions for all seven categories. The inter-rater reliability for these categories ranged from r=.770 to r=1.00 (see Table 6.20).

The students in the Yoga and exercise groups described a similar number of behavioral changes. The Yoga students provided 55% of responses, and the exercise students provided 45%. Separate Variance T-test confirmed a lack of significant difference between the two groups ($t=.236$, $df=17$, $p>.05$).

In addition, the pattern of responses seemed remarkably similar for the two groups of subjects. Most items seemed evenly distributed between four most popular categories: "relationships" (14 items, 33%), "feelings and emotions" (9 items, 21%), "cognition/thinking pattern" (6 items, 14%) and "daily behavior" (6 items, 14%).

Most often, students mentioned their relationships (8 items by the Yoga students, 19%; 6 items by the exercise students, 14%). In both groups, the students most commonly talked about the changes in their communication style (7 items by the Yoga students, 17%; 5 items by the exercise students, 12%). For instance, the subjects said that the course made them act more pleasant with others, and caused them to talk about feeling good. The other topic, "interpersonal skills," was mentioned only twice.

The second probe, "how can you tell," focused on the students' subjective perception of their PE course effectiveness. Ten Yoga and nine exercise subjects answered this question. The subjects provided 46 responses, 25 by the Yoga students and

21 by the exercise students. On the average, students gave 2.4 examples of subjective changes. Among the Yoga students, five was the greatest number of responses, given by one student, and one was the least number of responses, given four times. Similarly, among the exercise students, five was the greatest number of responses, given by one student, and one was the least number of responses, given four times.

Content analysis of these responses revealed eight broad themes: cognition/thinking patterns, relationships, physiological response, physical self-perception, daily behavior, exercise and practice, feelings and emotions and "nothing." Each theme, was composed of a maximum of four logically related topics. The structure of these categories is very similar, but not exactly the same as the categories for the previous question. For example, the "cognition/thinking patterns" category for this probe was divided into four topics (and not three): focus and concentration, attitude, self-esteem and strategy. The definitions of all categories are listed in Table 6.21. The number of responses within each category is listed in Table 6.22.

Pearson Correlation Analysis confirmed the reliability of definitions for all categories, except for "exercise and practice." The inter-rater reliability for the valid categories ranged from r=.804 to r=1.00 (see Table 6.23).

As in the previous probe, the students in the Yoga and exercise groups described a similar number of changes. Overall, the Yoga students provided 54% of responses, and the exercise students provided 46%. Separate Variance T-test confirmed a lack of significant difference between the two groups ($t=.467$, $df=17$, $p>.05$).

Majority of the items were concentrated in two categories: "feelings and emotions" (15 items, 33%) and "cognition/thinking pattern" (14 items, 30%). The remaining 37% of valid responses were evenly distributed among the four remaining categories. This pattern applied to both groups of students.

Most often, students mentioned their feelings and emotions (7 items by the Yoga students, 15%; 8 items by the exercise students, 17%). In both groups, the students most commonly talked about the changes in their experience of positive emotions (4 items by the Yoga students, 9%; 5 items by the exercise students, 11%). For example, they talked about having a better overall sense of well-being, or feeling better about themselves. The students provided three responses for each of the remaining two topics: "negative emotions" and "relaxation."

The students also commonly talked about their thinking and cognition (7 items by the Yoga students, 15%; also, 7 items by the exercise students, 17%). The students in the two groups provided an equal number of responses for this category. These responses were evenly distributed between four topics: focus and concentration (2 responses, 4%), attitude (2 responses, 4%), self-esteem (5 responses, 11%); and strategy (5 responses, 11%). For example, the students described believing that they can accomplish greater things, or that they can organize their thoughts and "clear the mind."

Because students' responses to the two probes formed such similar hierarchies of categories, it was possible to compare the two sets of items. Repeated-measures ANOVA was used to compare the three most commonly mentioned categories: cognition/thinking patterns, relationships, and feelings and emotions. Analysis showed that there was a

significant interaction between the type of category and the type of question ($F(2,30)=5.519$, $p<.05$). The "relationships" category was most frequently mentioned when students talked about the changes noticed by others; however, this category was mentioned only twice when people talked about their subjective changes. In contrast, the categories "feelings and emotions" and "cognition/thinking pattern" became more popular when people talked about the changes that they noticed internally. Bonferroni t-test analysis confirmed that there was a significant reduction in the number of responses to the category "relationships" between the first and second probe ($t=-2.954$, $p<.01$).

Table 6.1. Are there times when you feel stressed?

		Yoga	Exercise	Total
Agree	agree and provide a single example of stress say "yes" without elaborating	5	7	12
Definitely agree	agree and provide a number of examples of stress say "definitely" or "absolutely"	5	3	8

Table 6.2. Hierarchy of categories: What specifically do you feel stressed about today?

1		DAILY ROUTINE	
	A	Daily tasks	daily decisions arranging daily schedule
	B	Interpersonal situations	intimate relationships family
	C	Eating	diet meal times
	D	Logistical support	money legal issues
2		OCCUPATION/ SCHOOL	
	A	Challenge	completing a difficult project, test or paper research thesis or project
	B	Number of projects	working on a number of projects at the same time take a number of tests in a row amount of work
	C	Performance	evaluation of the quality of work grades deadlines completing work on time
3		FUTURE CONCERNS	
	A	Milestones/ Lifestyle change	graduation job direction end of semester job overseas
	B	Existential concerns	fear of getting fat fear of having cancer
	C	Making plans	making plans ahead
4		NOTHING	a good day no stressful events today

Table 6.3. Rating of Responses: What specifically do you feel stressed about today?

		Category	Yoga	Exercise	Total
		<All responses>	16	28	44
1		DAILY ROUTINE	4	4	8
	A	Daily tasks	2	0	2
	B	Interpersonal situations	1	2	3
	C	Eating	0	1	1
	D	Logistical support	1	1	2
2		OCCUPATION/ SCHOOL	7	15	22
	A	Challenge	2	6	8
	B	Number of projects	1	5	6
	C	Performance	4	4	8
3		FUTURE CONCERNS	4	7	11
	A	Milestones/ Lifestyle change	2	5	7
	B	Existential concerns	0	2	2
	C	Making plans	2	0	2
4		NOTHING	1	2	3

Table 6.4. Inter-Rater Reliability: What specifically do you feel stressed about today?

Rater 1 Rater 2	Daily Routine	Occupation/ School	Future Concerns	Nothing
Daily Routine	.916**	.199	-.068	-.194
Occupation/ School	.303	.876**	-.411	-.288
Future Concerns	-.220	-.078	.972**	-.210
Nothing	-.178	-.345	-.214	1.000**

* = $p < .05$

** = $p < .001$

Table 6.5. Are there times during the course of the semester when you feel more stress than at other times?

		Category		Yoga	Exercise	Total
		<all responses>		17	19	36
1		CHRONOLOGICAL CALENDAR		7	9	16
	A	Beginning of the semester		0	2	2
	B	Middle of the semester		0	1	1
	C	End of the semester		6	6	12
	D	Calendar event	seasons, weather, events unrelated to school	1	0	1
2		SCHOOL EVENTS		9	9	18
	A	Finals		4	3	7
	B	Mid-term exams		1	2	3
	C	Deadlines	exams, papers, projects, oral exams	4	4	8
3		NO SPECIFIC TIME	all the time, or cannot tell	1	1	2

Table 6.6. Inter-Rater Reliability: Are there times during the course of the semester when you feel more stress than at other times?

Rater 1 Rater 2	Chronological Calendar	School Events	No Specific Time
Chronological Calendar	1.00**	-.724*	-.134
School Events	-.557	.929**	-.174
No Specific Time	-.134	-.123	1.00**

* = $p < .05$

** = $p < .001$

Table 6.7. Hierarchy of Categories: How can people around you tell that you are stressed?

1		RELATIONSHIPS	
	A	Communication style	answer quickly, without giving details talk about problems (or the opposite, avoid talking about problems) talk a lot (or the opposite, avoid talking) complain talk in monotone (or the opposite, raise voice)
	B	Interpersonal contact	not outgoing, not friendly shy, quiet seek less contact with people, socialize less
	C	Interpersonal skills	listen less carefully not look in the eyes not offer help general difficulty interacting with others
2		COGNITIVE PATTERNS	
	A	Attitude	think more about self focus on tasks try to "get things done"
	B	Concentration	feel focused and concentrated (or the opposite, unable to concentrate) feel that mind is racing
3		PHYSIOLOGICAL RESPONSE	
	A	Autonomous system response	change in sleeping patterns wheezing body tension face breaking out
	B	Appearance	flat affect look in bad mood
	C	Ritualistic behavior	cleaning to perfection biting finger nails

Continued, next page.

Table 6.7. Continued.

4		FEELINGS AND EMOTIONS	
	A	Negative feelings	anger, frustration, irritability, acting "snappy" anxiety, feeling "on edge" sadness
	B	Mood and temper	potential to show negative feelings mood swings short temper not laid back
5		NO	do not show stress do not want others to see stress "hold in" signs and symptoms

Table 6.8. Rating of Responses: How can people around you tell that you are stressed?

		Category	Yoga	Exercise	Total
		< all responses >	29	47	76
1		RELATIONSHIPS	12	25	37
	A	Communication style	5	13	18
	B	Interpersonal contact	7	8	15
	C	Interpersonal skills	0	4	4
2		COGNITIVE PATTERNS	4	2	6
	A	Attitude	1	1	2
	B	Concentration	3	1	4
3		PHYSIOLOGICAL RESPONSE	5	10	15
	A	Autonomous system response	3	3	6
	B	Appearance	2	4	6
	C	Ritualistic behavior	0	3	3
4		FEELINGS AND EMOTIONS	6	10	16
	A	Negative feelings	2	6	8
	B	Mood and temper	4	4	8
5		NO	2	0	2

Table 6.9. Inter-Rater Reliability: How can people around you tell that you are stressed?

Rater 1 Rater 2	Relation.	Cognitive Patterns	Physio. Resp.	Feelings and Emot.	No
Relationships	.970**	-.168	-.330	-.089	-.272
Cognitive Patterns	-.338	.809**	-.062	-.320	.840**
Physiological Response	-.066	.194	.911**	-.211	-.196
Feelings and Emotions	.074	-.348	-.074	.923**	-.235
No	-.115	.435	-.214	.254	.818**

* = $p < .05$

** = $p < .001$

Table 6.10. Hierarchy of Categories: How can you tell?

1		RELATIONSHIPS	
	A	Communication style	answer quickly (or the opposite, talk continuously)
	B	Interpersonal contact	not friendly not smile seek less contact with people, socialize less
2		COGNITIVE PATTERNS	
	A	Concentration	feel more focused pay more attention think about one specific topic
	B	Planning	plan ahead organize thoughts strategize
	C	Intensity of thought process	aware of thinking more intensely think all the time
3		PHYSIOLOGICAL RESPONSE	
	A	Change in sleeping pattern	difficulty falling asleep sleep less
	B	Change in energy level	more tired (or the opposite, hyper-energetic)
	C	Health problems	cold migraine skin rash
	D	Other autonomic system responses	tension in body change in appetite crying easily
4		FEELINGS AND EMOTIONS	
	A	Anxiety	feel anxious or worried
	B	Negative feelings, other than anxiety	sad, depressed, irritable
	C	Relaxation	feel less relaxed
	D	Emotional vulnerability	bad mood labile more emotional, in general

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Table 6.10. Continued.

5		OVERT BEHAVIOR	
	A	Food preference	coffee
	B	Change in schedule	less time to do exercise less time by self study more
	C	Ritualistic behavior	re-write notes straighten room
6		NO SPECIFIC SIGN	"everything"

Table 6.11. Rating of Responses: How can you tell?

		Category	Yoga	Exercise	Total
		<all responses>	32	34	66
1		RELATIONSHIPS	0	5	5
	A	Communication style	0	3	3
	B	Interpersonal contact	0	2	2
2		COGNITIVE PATTERNS	3	4	7
	A	Concentration	0	1	1
	B	Planning	1	1	2
	C	Intensity of thought process	2	2	4
3		PHYSIOLOGICAL RESPONSE	18	7	25
	A	Change in sleeping pattern	4	3	7
	B	Change in energy level	3	2	5
	C	Health problems	3	1	4
	D	Other autonomic system responses	8	1	9
4		FEELINGS AND EMOTIONS	7	6	13
	A	Anxiety	4	2	6
	B	Negative feelings, other than anxiety	2	3	5
	C	Relaxation	0	1	1
	D	Emotional vulnerability	1	0	1
5		OVERT BEHAVIOR	2	11	13
	A	Food preference	1	0	1
	B	Change in schedule	1	8	9
	C	Ritualistic behavior	0	3	3
6		NO SPECIFIC SIGN	2	1	3

Table 6.12. Inter-Rater Reliability: How can you tell?

Rater 1 Rater 2	Relation.	Cognitive Patterns	Physio. Resp.	Feelings and Emotions	Overt Behav.	No Specific Sign
Relationships	.969**	-.136	-.190	.136	-.079	-.089
Cognitive Patterns	-.111	1.00**	-.205	-.242	-.010	-.152
Physiological Response	-.228	-.205	1.00**	-.232	-.222	-.146
Feelings and Emotions	.111	-.242	-.232	1.00**	-.280	-.137
Overt Behavior	-.105	-.027	-.146	-.312	.988**	-.144
No specific sign	-.072	-.152	-.146	-.137	-.132	1.00**

* = $p < .05$

** = $p < .001$

Table 6.13. Hierarchy of Categories: What do you do to cope with stress?

1		DISTRACTION	
	A	Pleasurable activity	party go out watch movies
	B	Intellectual activity	read listen to music make crafts or jewelry
	C	Sensory distraction	eat sleep have sex drink coffee take a shower
2		COGNITIVE CHANGE	
	A	Thought blocking	forget or ignore intentionally stop thinking about the topic
	B	Attitude change	think logically rationalize or create explanations re-prioritize
3		INTERPERSONAL SUPPORT	
	A	Self-disclosure	talk about stress complain
	B	Search for empathy	share with friends and ask for feedback find ways to receive support, feel loved seek company of friends
4		GOAL-ORIENTED ACTIVITY	
	A	Constructive action	get the work done study, write a paper, take an exam "deal with it" eliminate distractions
	B	Change in environment	leave room take a break enforce quite time or "time-out" stop stressful activity
	C	Consciousness-altering techniques	engage in meditation do an exercise in mental imagery relax consciously

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Table 6.13. Continued.

5		PHYSICAL ACTIVITY	
	A	Exercise	walk, run or jog exercise
	B	Yoga	do Yoga postures use breathing techniques
6		NOTHING	nothing not too much don't know

Table 6.14. Rating of Responses: What do you do to cope with stress?

		Categories	Yoga	Exercise	Total
		<all responses>	51	57	108
1		DISTRACTION	12	13	25
	A	Pleasurable activity	2	2	4
	B	Intellectual activity	5	3	8
	C	Sensory distraction	5	8	13
2		COGNITIVE CHANGE	7	3	10
	A	Thought blocking	4	2	6
	B	Attitude change	3	1	4
3		INTERPERSONAL SUPPORT	8	6	14
	A	Self-disclosure	3	1	4
	B	Search for empathy	5	5	10
4		GOAL-ORIENTED ACTIVITY	7	16	23
	A	Constructive action	0	7	7
	B	Change in environment	6	6	12
	C	Consciousness-altering techniques	1	3	12
5		PHYSICAL ACTIVITY	16	11	27
	A	Exercise	5	7	12
	B	Yoga	11	4	15
6		NOTHING	1	8	9

Table 6.15. Inter-Rater Reliability: What do you do to cope with stress?

Rater 1 Rater 2	Distract.	Cognitive Change	Interp. Support	Goal-Oriented Activity	Physical Activity	Noth.
Distraction	1.00**	-.186	-.310	-.010	-.133	-.120
Cognitive Change	-.164	.882**	.00	-.035	-.205	-.101
Interpersonal Support	-.310	.216	1.00**	-.161	-.134	-.314
Goal-Oriented Activity	-.062	-.171	-.161	.901**	-.136	.044
Physical Activity	-.133	-.027	-.134	-.121	1.00**	-.060
Nothing	-.123	-.158	-.263	-.084	-.147	.964**

* = $p < .05$

** = $p < .001$

Table 6.16. In what ways, if any, did taking the course help you manage your stress?

			Yoga	Exercise	Total
A	very helpful	student had a strong positive response to the question student provided a number of positive examples, and no negative ones	8	5	13
B	helpful	student felt that the course was helpful student provided one positive example, and no negative ones student provided a number of positive examples and one negative	0	3	3
C	not certain	student was not certain whether the course was helpful student said, "not sure," or "not enough time," or "maybe in the future" a number of positive examples balanced off the number of negative	1	0	1
D	negative effect	student said that the course was not helpful student provided a number of negative examples, and few positive ones	0	2	2

Table 6.17. Inter-Rater Reliability: In what ways, if any, did taking the course help you manage your stress?

Rater 1 Rater 2	Very Helpful	Helpful	Negative Effect
Very Helpful	1.00**	-.721*	-.391
Helpful	-.721*	1.00**	-.108
Negative Effect	-.570	-.158	.686*

* = $p < .05$

** = $p < .001$

Table 6.18. Hierarchy of categories: How can people around you tell if the course is effective?

1		COGNITION/ THINKING PATTERN	
	A	Attitude	change general attitude evaluate daily events more positively have "a better attitude"
	D	Awareness	focus more on self focus more on inner process: physical sensations, emotions and breathing
	C	Strategy	organize thoughts feel that thoughts are less jumbled "clear the mind"
2		RELATIONSHIPS	
	A	Communication style	act more pleasant with others show a sense of humor say "Yes" and "OK" more often talk about feeling good describe interesting, important events to friends
	B	Interpersonal skills	express self better talk slower, more clearly and coherently
3		PHYSICAL SELF-PERCEPTION	
	A	Ability	feel less sore when move feel more flexible
	B	General physical well-being	feel an increase in sense of energy feel better physically, overall
4		DAILY BEHAVIOR	
	A	Diet	change eating habits
	B	Timing and scheduling	create a "time-out" set aside time free of activity change daily routine (e.g. get up early)
5		EXERCISE AND PRACTICE	feel positively affected by the process of exercising feel better after doing the exercise practice Yoga postures and breathing

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Table 6.18. Continued.

6		FEELINGS AND EMOTIONS	
	A	Positive emotions	feel happy have an overall sense of well-being feel better about self feel that show positive personality changes
	B	Negative emotions	feel less negative emotions feel that the negative emotions are more "under control" feel that the negative emotions are less frequent feel less stress
7		NOTHING	nobody mentioned cannot tell do not know

Table 6.19. Ratings of responses: How can people around you tell if the course is effective?

		Category	Yoga	Exercise	Total
		<all responses>	23	19	42
1		COGNITION/ THINKING PATTERN	4	2	6
	A	attitude	1	1	2
	B	awareness	3	0	3
	C	strategy	0	1	1
2		RELATIONSHIPS	8	6	14
	A	communication style	7	5	12
	B	interpersonal skills	1	1	2
3		PHYSICAL SELF-PERCEPTION	2	2	4
	A	ability	2	0	2
	B	general physical well-being	0	2	2
4		DAILY BEHAVIOR	1	5	6
	A	diet	0	4	4
	B	timing and scheduling	1	1	2
5		EXERCISE AND PRACTICE	1	0	1
6		FEELINGS AND EMOTIONS	5	4	9
	A	positive emotions	5	3	8
	B	negative emotions	0	1	1
7		NOTHING	2	0	2

Table 6.20. Inter-Rater Reliability: How can people around you tell if the course is effective?

Rater 1 Rater 2	Cognit.	Relat.	Physical Self-P.	Daily Behav.	Exer. and Prac.	Feelings and Emot.	Nothing
Cognit.	1.00**	.074	-.224	-.154	.605	-.116	-.146
Relat.	.006	.933**	-.415	-.228	-.240	-.014	-.234
Physical Self-Percept.	-.224	-.341	1.00**	.326	-.108	-.222	-.121
Daily Behavior	-.154	-.180	.326	1.00**	-.074	-.154	-.084
Exercise and Practice	.605	-.198	-.108	-.074	1.00**	-.129	-.070
Feelings and Emotions	.102	.156	-.328	-.155	-.190	.793*	-.169
Nothing	-.189	-.084	-.157	-.109	-.091	-.188	.770*

* = $p < .05$

** = $p < .001$

Table 6.21. Hierarchy of categories: How can you tell?

1		COGNITION/ THINKING PATTERN	
	A	focus and concentration	focus on one particular topic concentrate better, more easily
	B	attitude	change general attitude evaluate daily events more positively have "a better attitude"
	C	self-esteem	believe that can accomplish things believe that do things to help self and improve self
	D	strategy	organize thoughts feel that thoughts are less jumbled "clear the mind"
2		RELATIONSHIPS	act more pleasant with others show a sense of humor say "Yes" and "OK" more often talk about feeling good describe interesting, important events to friends
3		PHYSIOLOGICAL RESPONSE	sleep better have less body tension
4		PHYSICAL SELF-PERCEPTION	experience less physical pain have less health problems (e.g. migraines, back pain)
5		DAILY BEHAVIOR	create a "time-out" set aside time free of activity change daily routine (e.g. get up early)

Continued, next page.

Table 6.21. Continued.

6		EXERCISE AND PRACTICE	feel positively affected by the process of exercising feel better after doing the exercise practice Yoga postures and breathing
7		FEELINGS AND EMOTIONS	
	A	positive emotions	feel happy have an overall sense of well-being feel better about self feel that show positive personality changes
	B	negative emotions	feel less negative emotions feel that the negative emotions are more "under control" feel that the negative emotions are less frequent feel less stress
	C	relaxation	feel more relaxed
8		NOTHING	nobody mentioned cannot tell do not know

Table 6.22. Rating of Responses: How can you tell?

		Category	Yoga	Exercise	Total
		<all responses>	25	21	46
1		COGNITION/ THINKING PATTERN	7	7	14
	A	focus and concentration	1	1	2
	B	attitude	2	0	2
	C	self-esteem	2	3	5
	D	strategy	2	3	5
2		RELATIONSHIPS	2	0	2
3		PHYSIOLOGICAL RESPONSE	4	1	5
4		PHYSICAL SELF-PERCEPTION	2	1	3
	A	health	2	0	2
	B	general physical well-being	0	1	1
5		DAILY BEHAVIOR	1	1	2
6		EXERCISE AND PRACTICE	1	2	3
7		FEELINGS AND EMOTIONS	7	8	15
	A	positive emotions	4	5	9
	B	negative emotions	1	2	3
	C	relaxation	2	1	3
8		NOTHING	1	1	2

Table 6.23. Inter-Rater Reliability: How can you tell?

Rater 1 Rater 2	Cogn.	Relat.	Physio. Resp.	Physical Self-Percep.	Daily Behav.	Exer. and Pract.	Feel. and Emot.	No
Cognit.	1.00**	.099	.321	-.033	-.089	.007	.163	-.278
Relat.	.099	1.00**	-.233	-.149	-.118	-.177	-.295	-.118
Physio. Resp.	.436	-.205	.880**	.069	.184	.278	-.159	-.205
Physical Self-Percep.	-.033	-.149	.327	1.00**	.322	.130	-.372	-.149
Daily Behav.	-.089	-.118	.136	.322	1.00**	.664	-.040	-.118
Exercise and Practice	.125	-.149	.016	.208	.792*	.484	.271	-.149
Feelings and Emot.	.278	-.162	-.136	-.322	-.162	-.033	.804*	-.441
Nothing	-.278	-.118	-.233	-.149	-.118	-.177	-.295	1.00**

* = $p < .05$

** = $p < .001$

CHAPTER VII

SELF-CONCEPT AND PHYSICAL ACTIVITY

The third section of the structured interviews focused on the relationship between students' self-concept and their participation in a physical activity. In this section, the interviewer asked four sets of questions about the students' self-perception and the effect of the PE course on their self-concept. These questions were based on the hypothesis that students' self-concept changes as a result of engaging in a physical activity. An additional hypothesis proposed that positive changes in the students' physical self-concept would be related to an improvement in their psychological well-being.

Each student was asked the following sets of questions:

(1) "Do you think that you feel differently about yourself now?"

This question and the following probes encouraged the students to think about their self-concept and identify the influences on their self-perception.

(2) "How do you think you changed physically?"

This question and the following probes were intended to focus the students on their physical self-concept and define, in more concrete terms, how they may have changed in the course of the semester.

(3) "How do you think you changed emotionally?"

This question and the following probes were intended to focus the students on their emotional self-concept and define more precisely how they may have changed in the course of the semester.

(4) "Do you think that the course made a difference in the way you feel about yourself?"

This question and the following probes were intended to obtain the students' evaluation of the PE course effectiveness in changing their self-concept.

A. Question One

The first question stated, “Do you think that you feel differently about yourself now?” This question was followed by a probe, "What happened during the semester to make that change?"

The content analysis of the main question focused on the subjects' overall evaluation of the extent to which their experience of themselves has changed during the course of the semester. Ten exercise students and eight Yoga students responded to this question. The responses were judged on a four-point scale, "definite positive change," “positive change,” “no change” and “negative change.” For example, a response was assigned to the "definite positive change" category if a student said "absolutely," or if a student provided a number of specific examples of a positive change in self-perception.

Overall, most students (89%) described feeling that they have changed positively. Among the Yoga students, one subject described definite positive changes (6%), five

subjects said that they experience a positive change (28%), and two subjects were rated as either "no change" or "negative change" (11%). Among the exercise students, all responses were rated as "positive" or "definitely positive." Six exercise subjects described definite positive changes (33%), and four subjects said that they experienced a positive change (22%). Pearson Chi-Square analysis indicated that the pattern of responses was similar for the two groups (X^2=5.529, df=3, p>.05).

In response to the probe, seventeen subjects (eight from the Yoga group and nine from exercise) described the events leading to a change in their self-concept. Overall, the subjects provided 43 examples of such events, 21 by the Yoga students and 22 by the exercise students. On the average, each student gave 2.4 examples of events leading to such a change. Among the Yoga students, five was the greatest number of responses, given by two different subjects, and one was the least number of responses, given three times. Among the exercise students, four was the greatest number of responses, given twice, and one was the least number of responses, also given twice.

The content analysis of these responses revealed five broad themes: relationships, learning process, external reasons, cognitive patterns and exercise and practice. Each theme was composed of up to four logically related topics. For example, the theme "exercise and practice" included four sub-topics: exercise, Yoga, practice and exertion. The definitions of all categories are listed in Table 7.2. The number of responses within each category are summarized in Table 7.3.

Pearson Correlation Analysis confirmed the reliability of these categories. The inter-rater reliability ranged from .59 to 1.00 (see Table 7.4). All the categories were included in further analyses.

Separate Variance T-test suggested that the two groups of students provided a similar number of responses ($t=.247$, $df=12$, $p>.05$). Indeed, the Yoga students provided 49% of responses, and the exercise students provided the remaining 51%. It appeared that, in both groups, the students' self-concept was affected by either two or three events, during the course of the semester.

Within this question, the majority of responses were evenly divided between three categories: learning process (10 responses, 23%), external reasons (10 responses, 23%) and exercise and practice (13 responses, 30%). However, the pattern of responses appeared different for the two groups of students. For example, only one exercise student (2%) talked about learning, whereas the Yoga students provided nine responses (21%) within that category. According to Separate Variance T-test analysis, this difference was significant ($t=2.453$, $df=8$, $p<.05$). Similarly, only two Yoga students (5%) talked about external reasons, whereas eight exercise students (19%) talked about such events. According to Separate Variance T-test analysis, this difference approached significance ($t=2.076$, $df=13$, $p<.06$).

Most frequently, the students mentioned the theme of exercise and practice (13 responses, 30%). Separate Variance T-test analysis suggested that this category was similarly popular for both groups of students ($t=.713$, $df=15$, $p>.05$). Indeed, the Yoga students talked about physical activity five times (12%), and the exercise students

mentioned this theme eight times (19%). Within this category, the majority of responses seemed evenly distributed between three topics: Yoga (4 responses, 9%), practice (4 responses, 9%) and exertion (3 responses, 7%). However, there appeared to be a difference in the pattern of responses between the Yoga and exercise students. For example, all the responses in the "Yoga" sub-topic (4 items, 9%) belonged to the Yoga students, and all the items describing "exertion" belonged to the exercise students (3 items, 7%).

B. Question Two

The second question stated, "How do you think you changed physically?" This question was followed by two probes, " In what situations do you notice the change?" and "How do you think people who are close to you tell the difference?"

The content analysis of the main question focused on the subjects' perception of a change in their physical experience. Seven exercise students and eight Yoga students responded to this question. Overall, the subjects provided 34 examples of a change in their physical self-perception, 23 (68%) by the Yoga students and 11 (32%) by the exercise students. On the average, each student gave 2.3 examples of such a change. Among the Yoga students, four was the greatest number of responses, given by two different subjects, and one was the least number of responses, given once. Among the exercise students, two was the greatest number of responses, given four times, and one was the least number of responses, given three times.

The content analysis of these responses revealed four broad themes: cognitive patterns, physical self-perception, feelings and emotions and "no." Each theme was composed of up to four logically related topics. For example, the theme "physical self-perception" included four sub-topics: physical attributes, physical ability, health and general physical well-being. The definitions of all categories are listed in Table 7.5. The number of responses within each category are summarized in Table 7.6.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability ranged from .85 to 1.00 (see Table 7.7). All the categories were included in further analyses.

Separate Variance T-test indicated significant difference in the number of responses between the two groups of students ($t=3.223$, $df=11$, $p<.01$). Indeed, the Yoga students provided 68% of the responses, and the exercise students provided only 32%. It is likely that the difference is due to the Yoga students' responses to the categories "cognitive patterns" and "feelings and emotions." The Yoga students said six times (18%) that they perceived a change in their mind/body attitude and in their self-esteem. In contrast, the exercise students mentioned these topics only once (3%). Similarly, the Yoga students mentioned their feelings three times (9%), for example, feeling "the natural high" or being "unhappy about being fat." In contrast, the exercise students mentioned their emotions only once (3%).

For this question, most of the items were related to the category "physical self-perception" (20 responses, 59%). The Yoga students contributed 13 items (38%) to this category, and the exercise students contributed 7 items (21%). Separate Variance T-test

suggested that the difference between these two groups of items was not significant ($t=1.127$, $df=12$, $p>.05$). Most often, the students talked about their physical abilities, such as flexibility, strength or endurance (9 responses, 26%). The second most popular sub-topic was "physical attributes" -- weight, posture or body shape -- (6 responses, 18%).

The responses to the probe, "In what situations do you notice the change," showed the subjects' understanding of the stimuli for change in their physical experience. Seven exercise and seven Yoga students responded to this question. Overall, the subjects provided 33 examples of situations illustrating a change in their physical self-perception, 19 (58%) by the Yoga students and 14 (42%) by the exercise students. On the average, each student gave 2.4 examples of such situations. Among the Yoga students, four was the greatest number of responses, given once, and one was the least number of responses, also given once. Among the exercise students, three was the greatest number of responses, given twice, and one was the least number of responses, also given twice.

The content analysis of these responses suggested that such stimuli could be grouped into five broad themes: class-related events, daily routine, occupation, physical activity and change of seasons. Each theme was composed of up to four logically related topics. For example, the theme "physical activity" included three sub-topics: exercise, Yoga and unstructured activity. The definitions of all categories are listed in Table 7.8. The number of responses within each category are summarized in Table 7.9.

Pearson Correlation Analysis confirmed the reliability of these categories. The inter-rater reliability ranged from .61 to 1.00 (see Table 7.10). All the categories were included in further analyses.

Separate Variance T-test suggested a lack of significant difference in the number of responses between the two groups of students ($t=1.508$, $df=12$, $p>.05$). The Yoga students provided 19 responses (58%), and the exercise students responded with similar frequency (14 items, 42%).

The majority of the items were related to the category "daily routine" (19 responses, 58%; 11 by the Yoga students and 8 by the exercise students). Separate Variance T-test confirmed that the two groups of students mentioned this category with similar frequency ($t=.854$, $df=10$, $p>.05$). The students described such situations as putting on their clothes, or having conversations with friends. All responses seemed evenly divided among four sub-topics: appearance (6 items, 18%), affect (5 items, 15%), interpersonal contact (4 items, 12%) and daily tasks (4 items, 12%).

The responses to another probe, "How do you think people who are close to you tell the difference?," showed the subjects' understanding of a change in their behavior. Six exercise and six Yoga students responded to this question. Overall, the subjects provided 21 examples of behavior showing a change in their physical self-perception, 11 by the Yoga students and 10 by the exercise student. On the average, each student gave 1.8 examples of such behavioral changes. Among the six Yoga students, one person provided a single response, and the rest provided two responses each. Among the

exercise students, four was the greatest number of responses, given once, and one was the least number of responses, given four times.

The content analysis of these responses suggested that all behavioral changes could be grouped into three broad themes: relationships, physical manifestation, and affect. Each theme was composed of up to four logically related topics. For example, the theme "relationships" included two sub-topics: communication and interpersonal contact. The definitions of all categories are listed in Table 7.11. The number of responses within each category are summarized in Table 7.12.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability ranged from .88 to 1.00 (see Table 7.13). All the categories were included in further analyses.

Separate Variance T-test indicated a lack of significant difference in the number of responses between the two groups of students ($t=.319$, $df=6$, $p>.05$). The Yoga students provided 11 responses (52%), and the exercise students responded with similar frequency (10 items, 48%).

Most frequently, the subjects talked about two categories: their relationships (9 items, 43%) and their physical change (also, 9 items, 43%). For example, they described "complaining less," appearing "more active" or having "better posture." Within these two categories, the pattern of responses seemed different for the two groups of students. Yoga students provided only two responses (10%) for the category "relationships," whereas the exercise students provided seven responses (33%). In contrast, for the

category "physical manifestation," Yoga students provided seven responses (33%), whereas the exercise students provided only two responses (10%).

C. Question Three

The questions about emotional self-perception were very similar to the questions about physical self-concept. The main question stated, "How do you think you changed emotionally?" This question was followed by two probes, "In what situations do you notice the change?" and "How do you think people who are close to you tell the difference?"

The content analysis of the main question focused on the subjects' perception of a change in their emotional experience. Eight Yoga students and nine exercise students responded to this question. Overall, the subjects provided 46 examples of a change in their emotional self-perception, 22 (48%) by the Yoga students and 24 (52%) by the exercise students. On the average, each student gave 2.7 examples of such a change. Among the Yoga students, four was the greatest number of responses, given by three subjects, and one was the least number of responses, given twice. Among the exercise students, six was the greatest number of responses, given by one student, and one was the least number of responses, given twice.

The content analysis of these responses revealed four broad themes: relationships, learning process, cognition/thinking patterns, physical self-perception, feelings and emotions and "no." Each theme was composed of up to four logically related topics. For

example, the theme "feelings and emotions" included three sub-topics: positive emotions, negative emotions and relaxation. The definitions of all categories are listed in Table 7.14. The number of responses within each category are summarized in Table 7.15.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability ranged from .88 to 1.00 (see Table 7.16). All the categories were included in further analyses.

Separate Variance T-test showed a lack of significant difference in the number of responses between the two groups of students ($t=.117$, $df=15$, $p>.05$). The Yoga students provided 48% of the responses, and the exercise students provided a similar number of items, 52%.

As expected, students talked most often about their feelings and emotions (15 responses, 33%; 10 items by the Yoga students and 5 items by the exercise students). Although the Yoga students provided twice as many items, Separate Variance T-test showed a lack of significant difference in the number of responses between the two groups ($t=1.582$, $df=15$, $p>.05$). However, there appeared a difference in the students' pattern of responses. The Yoga students mentioned a reduction in their negative emotions four times (9%) and an increase in relaxation three times (7%). In contrast, the exercise students mentioned both topics only once (2%). However, both groups talked about an increase in positive emotions with similar frequency (3 items by the Yoga students, 7%; 4 items by the Yoga students, 9%).

The second most frequently mentioned theme was "cognition/thinking patterns" (14 responses, 30%; 7 items by the Yoga students and 7 items by the exercise students).

For example, the students discussed being able to "accept the situation" or think about themselves less critically. Separate Variance T-test confirmed a lack of significant difference in the number of responses between the two groups of students ($t=.189$, $df=14$, $p>.05$). This theme appeared equally popular with both groups of students.

The responses to the probe, "In what situations do you notice the change," showed the subjects' understanding of the stimuli for change in their emotional experience. Seven Yoga and eight exercise students responded to this question. Overall, the subjects provided 33 examples of situations showing a change in their emotions, 14 by the Yoga students and 19 by the exercise student. On the average, each student gave 2.2 examples of such situations. Among the Yoga students, three was the greatest number of responses, given once, and one was the least number of responses, also given once. Among the exercise students, five was the greatest number of responses, given once, and one was the least number of responses, also given once.

The content analysis of these responses suggested that such stimuli could be grouped into three broad themes: daily routine, occupation/school and "not certain." Each theme was composed of up to three logically related topics. For example, the theme "daily routine" included three sub-topics: appearance, affect and interpersonal contact. The definitions of all categories are listed in Table 7.17. The number of responses within each category are summarized in Table 7.18.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability ranged from .94 to 1.00 (see Table 7.19). All the categories were included in further analyses.

The students in both groups described a similar number of situations demonstrating an emotional change. Separate Variance T-test confirmed a lack of significant difference in the number of responses between the two groups ($t=.792$, $df=10$, $p>.05$). The Yoga students provided 14 responses (42%), and the exercise students responded with similar frequency (19 items, 58%).

The majority of the items were related to the category "daily routine" (28 responses, 85%; 10 by the Yoga students and 18 by the exercise students). Separate Variance T-test confirmed that the two groups of students mentioned this category with similar frequency ($t=1.486$, $df=13$, $p>.05$). The students described noticing an emotional change in such situations as putting on their clothes, or having conversations on the phone. The responses seemed concentrated in two sub-topics: affect (12 items, 36%) and interpersonal contact (14 items, 42%).

The responses to another probe, "How do you think people who are close to you tell the difference?," showed the subjects' understanding of a change in their behavior. Five Yoga and five exercise students responded to this question. Overall, the subjects provided 18 examples of behavior showing a change in their emotions, 10 by the Yoga students and 8 by the exercise student. On the average, each student gave 1.8 examples of such a behavioral change. Among the six Yoga students, three was the greatest number of responses, given twice, and one was the least number of responses, also given twice. Among the exercise students, three was the greatest number of responses, given once, and one was the least number of responses, given three times.

The content analysis of these responses suggested that all behavioral changes could be grouped into five broad themes: relationships, cognitive patterns, physical manifestation, affect and "not certain." Some of the themes included a few logically related sub-topics. For example, the theme "relationships" included two sub-topics: communication and interpersonal contact. The definitions of all categories are listed in Table 7.20. The number of responses within each category are summarized in Table 7.21.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability coefficients were all equal to 1.00 (see Table 7.22). All the categories were included in further analyses.

The students in both groups described a similar number of behavioral changes. The Yoga students provided 10 responses (56%), and the exercise students responded with similar frequency (8 items, 44%). Separate Variance T-test confirmed a lack of significant difference in the number of responses between the two groups of students ($t=.667$, $df=8$, $p>.05$). Also, the pattern of responses seemed similar for the two groups of students. All the responses seemed evenly distributed among the four main themes: relationships (5 items, 15%); cognitive patterns (4 items, 12%); physical manifestation (4 items, 12%); and affect (3 items, 9%).

D. Question Four

The fourth question stated, "Do you think that the course made a difference in the way you feel about yourself?" This question was followed by three probe, " What about

the course may have helped this change? How do you think the course help you change the way you feel about your physical abilities (quote from previous questions)? How do you think the course help you change the way you feel emotionally (quote from previous questions)?"

The content analysis of the main question focused on the subjects' overall evaluation whether the course affected their experience of themselves. Nine Yoga and ten exercise students responded to this question. The responses were judged on a four-point scale, "definitely made a difference," "made some difference," "not certain" and "no difference." For example, a response was assigned to the " definitely made a difference" category if a student said "definitely" or provided a number specific examples.

Overall, most students (84%) described thinking that the course affected their view of themselves. Among the Yoga students, all responses were rated in the "definite difference" or "some difference" categories. Four subjects said that the course definitely produced an effect on their self-perception (21%), and five subjects said that the course created some change in their feelings (26%). Among the exercise students, there were a few negative responses, but the majority of the items were positive. Three exercise subjects described a definite effect (16%), four subjects said that they experienced some change (21%), two subjects were uncertain (11%), and one subject denied feeling any change (5%).

Responses to the three probes were analyzed together. Sixteen subjects (nine from the Yoga group and seven from the exercise group) described the elements of the course which affected their self-concept. Overall, the subjects provided 103 examples,

66 by the Yoga students and 37 by the exercise student. On the average, each student gave 6.4 examples of experiences brought about by the course. Among the Yoga students, sixteen was the greatest number of responses, given by one subject, and two was the least number of responses, also given once. Among the exercise students, nine was the greatest number of responses, given by one subject, and three was the least number of responses, also given once.

The content analysis of these responses revealed seven broad themes: learning process, cognition/thinking patterns, physical self-perception, exercise and practice, feelings and emotions, daily routine and "not certain." Each theme was composed of up to five logically related topics. For example, the theme "cognition/thinking patterns" included five sub-topics: cognitive skills, attitude toward self and others, mind/body attitude, motivation and self-esteem. The definitions of all categories are listed in Table 7.24. The number of responses within each category are summarized in Table 7.25.

Pearson Correlation Analysis confirmed the high reliability of these categories. The inter-rater reliability ranged from .80 to 1.00 (see Table 7.26). All the categories were included in further analyses.

The Yoga students provided twice as many items as and the exercise students (66 items, 64% v. 37 items, 36%). However, Separate Variance T-test indicated a lack of significant difference in the number of responses between the two groups of students ($t=1.275$, $df=12$, $p>.05$).

Most frequently, the students mentioned the theme of thinking and cognition (28 responses, 27%; 21 items by the Yoga subjects and 7 items by the exercise subjects).

Separate Variance T-test analysis suggested that this category was similarly popular for both groups of students ($t=1.310$, $df=13$, $p>.05$). However, the pattern of responses seemed to differ for the two groups of students. Overall, the students most often talked about the effect of the course on self-esteem. For example, students talked about feeling "confident about the body" or "pushing potentials." The Yoga students provided six responses related to self-esteem (6%), whereas the exercise students provided only two responses (2%). In addition, the exercise students talked about the change in their motivation (5 items; 5%), while the Yoga students mentioned "motivation" only once (1%). Instead, the Yoga students talked about the change in their mind/body attitude (6 items; 6%), whereas the exercise students did not mention this topic at all.

The category "physical self-perception" was almost as popular as the theme of cognition (26 responses, 25%; 16 items by the Yoga subjects and 10 items by the exercise subjects). Separate Variance T-test analysis suggested that this category was equally popular for both groups of students ($t=.449$, $df=14$, $p>.05$). Majority of the students' statements about their physical self belonged to the topic of "physical ability" (15 items, 15%; 8 items by the Yoga subjects and 7 items by the exercise subjects). For example, the students talked about "strengthening the knee" and "making arms bigger."

Less frequently, the students described the theme of exercise and practice (19 responses, 18%; 11 items by the Yoga subjects and 8 items by the exercise subjects). Separate Variance T-test analysis suggested that this category was similarly popular for both groups of students ($t=.092$, $df=11$, $p>.05$). However, the pattern of responses seemed very different for the two groups of students. Overall, the students most often

talked about the effect of practicing Yoga (10 items, 10%), but none of these responses were provided by the exercise students . In contrast, the exercise students emphasized such topics as "exercise" (2 items, 2%), "practice" (2 items, 2%) or "exertion" (4 items, 4%).

Table 7.1. Do you think that you feel differently about yourself now?

		Yoga	Exercise	Total
Definite positive change	provide a number specific examples say "absolutely"	1	6	7
Positive change	say "yes" without elaborating say "a little" and give examples	5	4	9
No change	feel the same as before say "maybe"	1	0	1
Negative change	feel worse than before	1	0	1

Table 7.2. Hierarchy of Categories: What happened during the semester to make that change?

1		RELATIONSHIPS	
			establish new relationships receive positive feedback maintain an intimate relationships
2		LEARNING PROCESS	
	A	Realization & Insight	
			learn own feelings learn consequences of behavior learn about feelings of others
	B	Philosophy	
			learn new philosophy learn about Eastern culture
			e.g. holistic approach, holistic health, meditation
	C	Academic Learning	
			take more courses gain academic knowledge
3		EXTERNAL REASONS	
	A	Passage of Time	
			seasons changed stayed longer in one place
	B	School Events	
			received good grades received positive feedback met with academic success complete school term; graduate
	C	Dramatic Event	
			undergo a profound event e.g. moved to a different country, undergo life-threatening illness
4		COGNITIVE PATTERNS	
	A	Mind/body Attitude	
			develop physical self-awareness pay attention to physical body be aware of physical body

Continued, next page.

Table 7.2. Continued.

	B	Motivation	
			make a decision to change or improve create challenge for self set and achieve goals
	C	Self-esteem	
			think of self as independent think of self as competent
5		EXERCISE & PRACTICE	
	A	Exercise	
			engage in specific form of exercise e.g. tennis, lacrosse
	B	Yoga	
			engage in Yoga postures and breathing technique
	C	Practice	
			practice regular exercise routine practice a known exercise with more effort
	D	Exertion	
			become more physically active in general work out

Table 7.3. Rating of Responses: What happened during the semester to make that change?

		Categories	Yoga	Exercise	Total
		<all responses>	21	22	43
1		RELATIONSHIPS	1	1	2
2		LEARNING PROCESS	9	1	10
	A	Realization & Insight	4	1	5
	B	Philosophy	4		4
	C	Academic Learning	1		1
3		EXTERNAL REASONS	2	8	10
	A	Passage of Time	1	2	3
	B	School Events		4	4
	C	Dramatic Event	1	2	3
4		COGNITIVE PATTERNS	4	4	8
	A	Mind/body Attitude	1		1
	B	Motivation	3	2	5
	C	Self-esteem		2	2
5		EXERCISE & PRACTICE	5	8	13
	A	Exercise		2	2
	B	Yoga	4		4
	C	Practice	1	3	4
	D	Exertion		3	3

Table 7.4. Inter-Rater Reliability: What happened during the semester to make that change?

Rater 1 Rater 2	Relation.	Learning Process	External Reasons	Cogn. Patterns	Exercise and Practice
Relationships	.68	.61	.34	-.28	-.13
Learning Process	.66	.85**	.04	.03	.03
External Reasons	.15	.01	.90**	-.10	-.43
Cognitive Patterns	-.17	.13	.36	.59	-.36
Exercise and Practice	-.26	-.03	-.39	-.28	1.00**

* = $p < .05$
** = $p < .001$

Table 7.5. Hierarchy of Categories: How do you think you changed physically?

1		COGNITIVE PATTERNS	
	A	Mind/Body Attitude	
			have a greater awareness of physical body feel a greater balance between physical and mental self
	B	Self-esteem	
			evaluate overall self as being better, more worthy feel confidence or comfort in own abilities
2		PHYSICAL SELF-PERCEPTION	
	A	Physical Attributes	
			perceive a change in physical appearance: weight, posture, body shape, etc. think that body looks different, e.g. upper/lower body balance
	B	Physical Ability	
			perceive a change in flexibility, strength, endurance, etc. become able to perform tasks faster, stay with them longer, etc.
	C	Health	
			have less health problems (e.g. asthma)
	D	General Physical Well-being	
			have better muscle tone feel more energy, "grounded" feel more in-shape
3		FEELINGS AND EMOTIONS	
	A	Positive Feelings	
			feel better, happier feel the natural high
	B	Negative Feelings	
			feel bad about the condition of the body feel unhappy about being fat
4		NO	
			no change need to try harder

Table 7.6. Rating of Responses: How do you think you changed physically?

		Categories	Yoga	Exercise	Total
		<all responses>	23	11	34
1		COGNITIVE PATTERNS	6	1	7
	A	Mind/Body Attitude	3		3
	B	Self-esteem	3	1	4
2		PHYSICAL SELF-PERCEPTION	13	7	20
	A	Physical Attributes	4	2	6
	B	Physical Ability	6	3	9
	C	Health	1		1
	D	General Physical Well-being	2	2	4
3		FEELINGS AND EMOTIONS	3	1	4
	A	Positive Feelings	1	1	2
	B	Negative Feelings	2		2
4		NO	1	2	3

Table 7.7. Inter-Rater Reliability: How do you think you changed physically?

Rater 1 Rater 2	Cognitive Patterns	Physical Self-Perception	Feelings and Emotions	No
Cognitive Patterns	1.00**	-.12	.33	-.25
Physical Self-Perception	-.12	1.00**	-.61	-.49
Feelings and Emotions	.45	-.47	.85**	-.24
No	-.24	-.46	.26	.94**

* = $p < .05$

** = $p < .001$

Table 7.8. Hierarchy of Categories: In what situations do you notice the change?

1		CLASS-RELATED EVENTS	
			during class anticipating class, paying attention to attendance
2		DAILY ROUTINE	
	A	Appearance	
			posture, weight, fitting into clothes
	B	Affect	
			common feelings, attitude, outlook on life, physical discomfort
	C	Interpersonal Contact	
			seeing others, making a comparison interacting with others, receiving comments
	D	Daily Tasks	
			miscellaneous tasks that occur daily, without pre-meditation or scheduling
3		OCCUPATION	
			during work attitude toward work
4		PHYSICAL ACTIVITY	
	A	Exercise	
			in gym, on stair master, lifting weights
	B	Yoga	
			while doing Yoga
	C	Unstructured Activity	
			hiking, walking, standing
5		CHANGE OF SEASONS	
			putting on seasonal clothes; e.g. shorts in spring expecting a different season; e.g. approach of summer

Table 7.9. Rating of Responses: In what situations do you notice the change?

		Categories	Yoga	Exercise	Total
		<all responses>	19	14	33
1		CLASS-RELATED EVENTS	1	1	2
2		DAILY ROUTINE	11	8	19
	A	Appearance	4	2	6
	B	Affect	2	3	5
	C	Interpersonal Contact	2	2	4
	D	Daily Tasks	3	1	4
3		OCCUPATION	0	2	2
4		PHYSICAL ACTIVITY	5	3	8
	A	Exercise		2	2
	B	Yoga	1		1
	C	Unstructured Activity	4	1	5
5		CHANGE OF SEASONS	2	0	2

Table 7.10. Inter-Rater Reliability: In what situations do you notice the change?

Rater 1 Rater 2	Class-Related Events	Daily Routine	Occupation	Physical Activity	Change of Seasons
Class-Related Events	1.00**	.00	-.17	-.32	-.11
Daily Routine	.29	.61	-.16	-.32	-.11
Occupation	-.17	.00	1.00**	-.07	-.11
Physical Activity	-.28	-.53	-.04	.95**	-.19
Change of Seasons	-.11	.00	-.11	-.22	1.00**

* = $p < .05$

** = $p < .001$

Table 7.11. Hierarchy of Categories: How do you think people who are close to you tell the difference?

1		RELATIONSHIPS	
	A	Communication	
			tell people, stop complaining, act outgoing, use effective communication
	B	Interpersonal Contact	
			maintain contact with boyfriend, husband, parents, friends
2		PHYSICAL MANIFESTATION	
	A	Physical Attributes	
			appear different, refreshed, muscular, thin, etc.
	B	General Physical Well-being	
			appear in-shape, have higher muscle-tone, act more physically active
3		AFFECT	
	A	Positive Emotions	
			feel happy, or happier
	B	Relaxation	
			feel more relaxed

Table 7.12. Rating of Responses: How do you think people who are close to you tell the difference?

		Categories	Yoga	Exercise	Total
		<all responses>	11	10	21
1		RELATIONSHIPS	2	7	9
	A	Communication	1	4	5
	B	Interpersonal Contact	1	3	4
2		PHYSICAL MANIFESTATION	7	2	9
	A	Physical Attributes	4	2	6
	B	General Physical Well-being	3		3
3		AFFECT	2	1	3
	A	Positive Emotions	1	1	2
	B	Relaxation	1		1

Table 7.13. Inter-Rater Reliability: How do you think people who are close to you tell the difference?

Rater 1 Rater 2	Relationships	Physical Manifestation	Affect
Relationships	1.00**	-.33	-.27
Physical Manifestation	-.58	.88**	-.27
Affect	.13	.21	.89**

* = $p < .05$

** = $p < .001$

Table 7.14. Hierarchy of Categories: How do you think you changed emotionally?

1		RELATIONSHIPS	
			feel that relationships are better in general experience discomfort at tolerating physical and geographic distance feel uncertain in relationships, like do not have friends act less aggressive with others
2		LEARNING PROCESS	
			achieve realization or insight learn about feelings of others learn skills to manage stress learn new philosophy, or spirituality
3		COGNITION/ THINKING PATTERNS	
	A	Cognitive Skills	
			think more logically focus and concentrate better shut out distractions, or stop racing thoughts
	B	Attitude toward Self and Others	
			accept situation as is, without trying to change keep things in perspective
	C	Motivation	
			make a decision to change or improve create challenge for self set and achieve goals
	D	Self-esteem	
			evaluate self differently feel less "down on oneself" think of self as competent, capable of trying new things
4		PHYSICAL SELF-PERCEPTION	
			feel happier about own body

Continued, next page.

Table 7.14. Continued.

5		FEELINGS AND EMOTIONS	
	A	Negative Emotions	
			feeling less negative emotions: sadness, loneliness, isolation, etc.
	B	Positive Emotions	
			feeling more positive emotions: joy, pleasure, being carefree etc. feel better overall
	C	Relaxation	
			feel more relaxed, less stressed, more calm
6		NO	
			no change not sure about a change

Table 7.15. Rating of Responses: How do you think you changed emotionally?

		Categories	Yoga	Exercise	Total
		<all responses>	22	24	46
1		RELATIONSHIPS	2	3	5
2		LEARNING PROCESS	2	6	8
3		COGNITION/ THINKING PATTERNS	7	7	14
	A	Cognitive Skills	3	1	4
	B	Attitude toward Self and Others	3		3
	C	Motivation		1	1
	D	Self-esteem	1	5	6
4		PHYSICAL SELF-PERCEPTION	0	1	1
5		FEELINGS AND EMOTIONS	10	5	15
	A	Negative Emotions	4	1	5
	B	Positive Emotions	3	4	7
	C	Relaxation	3	0	3
6		NO	1	2	3

Table 7.16. Inter-Rater Reliability: How do you think you changed emotionally?

Rater 1 Rater 2	Relation.	Learning Process	Cognition	Physical Self-Percep.	Feelings and Emot.	No
Relationships	.91**	.25	-.11	-.13	.22	- 24
Learning Process	.28	.98**	-.15	-.10	-.25	-.05
Cognition/ Thinking Patterns	0.03	-.14	.92**	-.21	-.10	-.39
Physical Self-Perception	-.11	-.09	-.26	1.00**	-.19	-.12
Feelings and Emotions	.06	-.28	-.13	-.25	.88**	-.28
No	-.20	-.16	-.32	-.12	-.20	1.00**

* = $p < .05$

** = $p < .001$

Table 7.17. Hierarchy of Categories: In what situations do you notice the change?

1		DAILY ROUTINE	
	A	Appearance	
			wearing revealing clothes appraisal of own body
	B	Affect	
			common feelings about self and others level of calm or stress common attitude (e.g. "keeping things in perspective") level of confidence in own ability
	C	Interpersonal Contact	
			meeting with others communicating in person or on the phone using a different communication style (e.g. show less anger)
2		OCCUPATION/ SCHOOL	
			feelings about work in situations related to school
3		NOT CERTAIN	
			do not know

Table 7.18. Rating of Responses In what situations do you notice the change?

		Categories	Yoga	Exercise	Total
		<all responses>	14	19	33
1		DAILY ROUTINE	10	18	28
	A	Appearance		2	2
	B	Affect	3	9	12
	C	Interpersonal Contact	7	7	14
2		OCCUPATION/ SCHOOL	3	1	4
3		NOT CERTAIN	1	0	1

Table 7.19. Inter-Rater Reliability: In what situations do you notice the change?

Rater 1 Rater 2	Daily Routine	Occupation/School	Not Certain
Daily Routine	.97**	-.38	-.21
Occupation/School	-.55	.94**	-.12
Not Certain	-.19	-.13	1.00**

* = $p < .05$

** = $p < .001$

Table 7.20. Hierarchy of Categories: How do you think people who are close to you tell the difference?

1		RELATIONSHIPS	
	A	Communication	
			communicate feelings (e.g. say, "I miss you") smile
	B	Interpersonal Contact	
			spend time with others act social
2		COGNITIVE PATTERNS	
	A	Attitude	
			interested in others
	B	Self-esteem	
			evaluate self differently feel confident in own abilities
3		PHYSICAL MANIFESTATION	
			look better in clothes look more attractive, in general appear slower, more meditative
4		AFFECT	
			appear happy feel happy, calm
5		NOT CERTAIN	
			not sure do not know

Table 7.21. Rating of Responses: How do you think people who are close to you tell the difference?

		Categories	Yoga	Exercise	Total
		<all responses>	10	8	18
1		RELATIONSHIPS	3	2	5
	A	Communication	2	2	4
	B	Interpersonal Contact	1		1
2		COGNITIVE PATTERNS	1	3	4
	A	Attitude	1		1
	B	Self-esteem		3	3
3		PHYSICAL MANIFESTATION	2	2	4
4		AFFECT	3	0	3
5		NOT CERTAIN	1	1	2

Table 7.22. Inter-Rater Reliability: How do you think people who are close to you tell the difference?

Rater 1 Rater 2	Relation.	Cognitive Patterns	Physical Self-Perception	Feelings and Emotions	Not Certain
Relationships	1.00**	-.30	-.50	.22	-.50
Cognitive Patterns	-.30	1.00**	.08	-.07	-.30
Physical Self-Perception	-.50	.08	1.00**	.22	-.25
Feelings and Emotions	.22	-.07	.22	1.00*	-.33
Not Certain	-.50	-.30	-.25	-.33	1.00**

* = $p < .05$

** = $p < .001$

Table 7.23. Do you think that the course made a difference in the way you feel about yourself?

		Yoga	Exercise	Total
Definitely made a difference	provide a number specific examples say "definitely"	4	3	7
Made some difference	say "yes" without elaborating provide a single example	5	4	9
Not certain	not sure say "a little"		2	2
No difference	say "no"		1	1

Table 7.24. Hierarchy of Categories: What about the course may have helped this change?

1		LEARNING PROCESS	
			learn different philosophy, e.g. "being in the moment" or "integration of philosophy and physical" influenced by the instructor influenced by experience in the class
2		COGNITION/ THINKING PATTERNS	
	A	Cognitive Skills	
			improve focus, concentration, attention better coping skills, e.g. "handling things"
	B	Attitude toward Self and Others	
			accept situation as is, without trying to change let thoughts "pass by" stop " taking things seriously"
	C	Mind/ Body Attitude	
			develop physical self-awareness learn to pay attention to physical body, e.g. feeling of feet pressing on the floor adapt holistic mind/body approach
	D	Motivation	
			create challenges for self set and achieved goals make a decision to continue investing effort into work
	E	Self Esteem	
			evaluate self differently feel confident in own abilities feel confident about one's social role, e.g. "purpose in life" feel "stronger emotionally"

Continued, next page.

Table 7.24. Continued.

3		PHYSICAL SELF-PERCEPTION	
	A	Physical Attributes	
			perceive a change in physical appearance have a different posture, stand taller
	B	Physical Ability	
			perceive a change in flexibility, strength, endurance, etc. perform tasks faster, stay with them longer, etc.
	C	Health	
			have less physical pain
	D	General Physical Well-Being	
			feel better overall feel overall difference in the body
4		EXERCISE AND PRACTICE	
	A	Exercise	
			engage in new, specific form of exercise, e.g. karate kicks
	B	Yoga	
			engage in Yoga techniques: postures, body scan, breathing exercise, meditation
	C	Practice	
			practice regular exercise routine
	D	Exertion	
			become more physically active in general work out, exercise practice a known exercise with more effort

Continued, next page.

Table 7.24. Continued.

5		FEELINGS AND EMOTIONS	
	A	Positive Feelings	
			experience more positive emotions, e.g. joy or pleasure, peace feel better overall, e.g. "clear head" or "better state of mind"
	B	Negative Feelings	
			experience less stress think about stressful things
	C	Relaxation	
			like the feeling of relaxation notice the difference between tension and relaxation
6		DAILY ROUTINE	
			set aside time for introspection, Yoga or meditation change eating habits, e.g. limit junk food
7		NOT CERTAIN	
			no change, or difference due to other factors

Table 7.25. Rating of Responses: What about the course may have helped this change?

		Categories	Yoga	Exercise	Total
		<all responses>	66	37	103
1		LEARNING PROCESS	5	2	7
2		COGNITION/ THINKING PATTERNS	21	7	28
	A	Cognitive Skills	5		5
	B	Attitude toward Self and Others	3		3
	C	Mind/ Body Attitude	6		6
	D	Motivation	1	5	6
	E	Self Esteem	6	2	8
3		PHYSICAL SELF-PERCEPTION	16	10	26
	A	Physical Attributes	2	2	4
	B	Physical Ability	8	7	15
	C	Health	3	1	4
	D	General Physical Well-Being	3		3
4		EXERCISE AND PRACTICE	11	8	19
	A	Exercise		2	2
	B	Yoga	10		10
	C	Practice		2	2
	D	Exertion	1	4	5
5		FEELINGS AND EMOTIONS	10	5	15
	A	Positive Feelings	4	3	7
	B	Negative Feelings	1	2	3
	C	Relaxation	5		5
6		DAILY ROUTINE	3	4	7
7		NOT CERTAIN	0	1	1

Table 7.26. Inter-Rater Reliability: What about the course may have helped this change?

Rater 1 Rater 2	Learn.	Cogn.	Phys.	Exercise and Practice	Feelings	Daily Routine	Not Certain
Learning Process	.95**	.00	.14	.01	-.21	.20	-.16
Cognition/ Thinking Patterns	.07	.96**	.40	-.12	.09	-.02	-.21
Physical Self-Perception	.11	.64	.90**	-.22	.11	-.12	-.11
Exercise and Practice	-.03	-.24	.01	.91**	-.19	-.01	-.20
Feelings and Emotions	-.05	-.02	.23	-.05	.90**	-.23	-.32
Daily Routine	.06	.15	-.27	.27	-.08	.80*	.21
Not Certain	-.16	-.08	-.32	-.21	-.29	-.16	1.00**

* = $p < .05$

** = $p < .001$

CHAPTER VIII

BROAD ANALYSIS OF THE INTERVIEW DATA

After each interview question was examined individually, it became possible to pool the data and re-examine them from a broad perspective. This broad analysis used the tables of empirical data generated by the content analysis procedure. First, the graduate student, who was the investigator for this study, reviewed the tables containing hierarchies of categories. The investigator grouped similar categories into five broad themes: "cognition," "physical self-concept," "emotions," "overt behavior" and "relationships." These themes were repeated in response to different questions, at various times in the interview, and they encompassed the majority of responses. For example, the broad theme "cognition" included such categories as "cognition/thinking patterns," "learning" and "learning and knowledge." Detailed definitions of these themes are shown in Table 8.1. The few categories which did not comply with these definitions were omitted from further analysis. For example, the "external" category was excluded from the analyses. It contained such responses as "easy credit" and "convenient for schedule."

Second, the investigator reviewed the interview questions and identified four logical topic areas: "reasons," "stress," "self-concept" and "course effectiveness." For example, items for the topic area "reasons" included responses to the questions, "Thinking back to the beginning of the semester, why did you sign up for this course?"

and "What did you want to change about your life by signing up for this course?" The questions within each topic area are listed in Table 8.2. More general questions, which did not assess specific behaviors, were excluded from this table and omitted from further analysis. For example, the new definitions excluded questions which asked the subjects' general evaluation, such as, "Are there times when you feel stressed?" or "Do you think that you feel differently about yourself now than at the beginning of the semester?"

As a result of re-grouping the data, each student received twenty scores. Each score corresponded to the total number of responses that the student made during the interview, for each of the five broad themes, within each of the four topic areas. The data for all students are summarized in Table 8.3.

Finally, a theoretical model was drawn, to illustrate the interaction between the main topic areas (see Figure 8.1). Then, standard statistical procedures were used to test the resulting hypotheses:

(1) the overall pattern of responses is different for the Yoga and exercise groups;

(2) there is a significant relationship between the students' experience of stress and their reasons for selecting the course;

(3) there is a significant relationship between the students' reasons for signing up for the course and the perceived effectiveness of the course;

(4) there is a significant relationship between the students' experience of stress and their perception of the course effectiveness;

(5) there is a significant relationship between the perceived effectiveness of the course and the change in the students' self-concept.

A. Hypothesis One

The analysis of the overall pattern focused on the total number of responses that each subject provided to the five broad themes: "cognition," "physical self-concept," "emotions," "overt behavior" and "relationships." These data are graphically displayed in Figure 8.2.

Repeated-measures Analysis of Variance (ANOVA) confirmed that the pattern of responses was different for the Yoga and exercise groups. First, the analysis showed that there was little difference in the total number of responses between the two groups ($F(1,18)=2.77$, $p>.05$). There were 694 responses from the ten Yoga and ten exercise students. The number of responses was approximately equal. They Yoga subjects provided 381 items (55%), and the exercise students provided 313 items (45%).

Second, the analysis suggested that the topic of discourse significantly affected the number of responses ($F(4, 72)=5.11$, $p<.001$). For example, "cognition" was the most popular category of responses (182 responses, 26%). The second most popular category was "physical self-concept" (175 responses, 25%). In contrast, the "relationships" category received the least number of responses (87 items, 13%).

Third, the analysis suggested that this pattern of responses was significantly different between the two groups of students. ANOVA indicated a significant interaction between the variables "group" and "category" ($F(4, 72)=3.81$, $p<.01$). For example, the

Yoga students provided over twice as many items for the most popular category, "cognition," as the exercise students (127 responses, 18% v. 55 responses, 8%).

B. Hypothesis Two

This analysis focused on the hypothesis that the students' experience of stress was related to their reasons for signing up for the course. It showed mixed results, some confirming and others denying the hypothesis.

Pearson Correlational Analysis did not support the existence of a connection between all similar categories, within the two topic areas, "reasons" and "stress" (see the summary in Tables 8.4-8.6). For example, reviewing the correlation for all students, the degree of connection between the scores for the categories "reasons/cognition" and "stress/cognition" was minimal (r=-.01). However, there was a weak positive connection between the scores for the categories "reasons/relationships" and "stress/relationships" (r=.38). In contrast, the association between the scores for the categories "reasons/emotions" and "stress/emotions" was negative (r=-.46).

Multiple Regression analysis tested hypotheses that relationships may exist between selected categories, within these two topic areas, such as a relationship between the categories of "emotions" and "physical self-concept." Because the table potentially allowed a great number of models, it was necessary to minimize Type I error. Therefore, the analyses included the models only the categories which showed a significant degree of

correlation. Also, the models were verified by graphing the actual value of the dependent variable against its estimate.

First, the analysis suggested a moderate connection between the students' response to the category "stress/emotions" and the response for two other categories, "reasons/emotions" and "reasons/physical self-concept" ($R=.62$, $p<.02$). Figure 8.3 illustrates the relationship between the actual value of "stress/emotions" variable and its estimate. Repeated measures ANOVA verified that the model applied to both groups of students. The ANOVA showed that the interaction between the group and predictor variables was not significant ($F(2,36)=2.08$, $p>.05$). The more frequent discussion of emotions while talking about stress predicted less mentioning of that theme while discussing reasons for selecting a course ($r=-.46$, for all students). In contrast, the more frequent mentioning of emotions while talking about stress predicted more frequent mentioning of physical self-perception while talking about reasons ($r=.53$, for all students).

Second, Regression analysis suggested an association between the students' response to the category "reasons/physical self-concept" and the response for the categories "stress/behavior" and "stress/emotions" ($R=.74$, $p<.01$). Figure 8.4 illustrates the relationship between the actual value of "reasons/physical self-concept" variable and its estimate. Repeated measures ANOVA verified that the model applied to both groups of students. The ANOVA showed that the interaction between the group and predictor variables was not significant ($F(2,36)=2.10$, $p>.05$). The more frequent discussion of overt behavior while talking about stress predicted a more frequent mentioning of

physical self-concept while discussing the reasons for selecting a course (r=.51, for all students). Similarly, the more frequent discussion of emotions while talking about stress predicted a more frequent mentioning of physical self-concept while discussing the reasons for selecting a course (r=.53, for all students).

C. Hypothesis Three

This analysis focused on the hypothesis that the students' perception of course effectiveness was related to their reasons for signing up for the course. As previously, the analysis showed mixed results.

Pearson Correlational Analysis did not support a relationship between all similar categories within these two topic areas, "course effectiveness" and "reasons" (see the summary in Tables 8.7-8.9). For example, reviewing the corrections for all students, there was a weak negative association between the scores for the categories "effectiveness/emotion" and "reasons/emotion" (r=-.13), and similarly between the scores for the categories "effectiveness/behavior" and "reasons/behavior" (r=-.16). In contrast, there was a strong positive association between the scores for the categories "reasons/cognition" and "effectiveness/cognition" (r=.68).

Regression analysis tested hypotheses that relationships may exist between selected categories, within these topic areas. As previously, to minimize the Type I error, these analyses were based on the correlation coefficients which were statistically significant.

First, the analysis suggested a significant connection between the students' response to the categories "effectiveness/cognition" and "reasons/cognition" ($R=.68$, $p<.01$). Figure 8.5 illustrates the connection between the actual values of "effectiveness/cognition" and the estimates this regression model. Repeated measures ANOVA verified that the model applied to both groups of students. The ANOVA showed that the interaction between the group and predictor variables was not significant ($F(1,18)=1.52$, $p>.05$). The students who focused on their cognition while talking about their reasons for selecting the course were more likely to mention this theme while talking about course effectiveness ($r=.68$, for all students).

Second, Regression analysis suggested a weak association between the students' response to the categories "effectiveness/behavior" and "reasons/physical self-concept" ($R=.41$, $p<.07$). Figure 8.6 illustrates the relationships between the actual values of "reasons/physical self-concept" and the estimates of this model. Repeated measures ANOVA verified that the model applied to both groups of students. The ANOVA showed that the interaction between the group and predictor variables was not significant ($F(1,18)=2.11$, $p>.05$). The students who focused on their behavior while talking about their reasons for selecting the course were more likely to mention their physical self-concept while talking about course effectiveness ($r=.41$, for all students). This relationship was particularly significant for the exercise students ($r=.83$, $p<.01$).

D. Hypothesis Four

This analysis focused on the hypothesis that the students' experience of stress was related to their perception of course effectiveness. As in the other hypotheses, the analysis showed mixed results, some confirming and others denying the hypothesis.

Pearson Correlational Analysis did not support a relationship between all similar categories within these topic areas, "course effectiveness" and "stress" (see the summary in Tables 8.10-8.12). For example, reviewing the correlation coefficients for all students, there was a minimal relationship between the categories "effectiveness/relationships" and "stress/relationships" ($r=-.02$). There seemed to be a weak negative correlation between the scores for the categories "effectiveness/cognition" and "stress/cognition" ($r=-.14$). In contrast, there was a stronger positive association between the scores for the categories "effectiveness/behavior" and "stress/behavior" ($r=.57$).

Regression analysis tested hypotheses that relationships may exist between selected categories, within these topic areas. As previously, to minimize the Type I error, these analyses were based on the correlation coefficients which were statistically significant.

The analysis suggested a moderate connection between the students' response to the categories "effectiveness/behavior" and two other categories, "stress/behavior" and "stress/relationships" ($R=.72$, $p<.01$). Figure 8.7 illustrates the relationship between the actual values of "effectiveness/behavior" and the estimates of this regression model. Repeated measures ANOVA verified that the model applied to both groups of students.

The ANOVA showed that the interaction between the group and predictor variables was not significant ($F(2,36)=.75$, $p>.05$). The students who focused on their behavior while talking about stress were more likely to mention this theme while talking about course effectiveness ($r=.57$, for all subjects). In contrast, the students who talked about relationships and stress were less likely to mention their behavior while talking about course effectiveness ($r=-.48$, for all subjects).

E. Hypothesis Five

This analysis focused on the hypothesis that the perceived effectiveness of the course is related to the change in students' self-concept. Again, it showed mixed results, some confirming and others denying the hypothesis.

Pearson Correlational Analysis did not support a relationship between all categories, within these topic areas, "course effectiveness" and "self-concept" (see the summary in Tables 8.13-8.15). For example, reviewing the data for all students, the correlation between the scores for the categories "effectiveness/physical self-concept" and "self-concept/physical self-concept" was minimal ($r=.01$). There seemed to be a weak positive connection between the scores for the categories "effectiveness/cognition" and "self-concept/cognition" ($r=.29$). However, the association between the scores for the categories "effectiveness/relationships" and "self-concept/relationships" was negative ($r=-.23$).

Regression analysis tested hypotheses that relationships may exist between selected categories, within these topic areas. As previously, to minimize the degree of Type I error, these analyses were based on the correlation coefficients which were statistically significant.

The analysis suggested a moderate connection between the students' response to the categories "self-concept/physical self-concept" and "effectiveness/behavior" ($R=.67$, $p<.01$). Figure 8.8 illustrates the relationship between the actual values of "self-concept/physical self-concept" and the estimates of this model. Repeated measures ANOVA verified that the model applied to both groups of students. The ANOVA showed that the interaction between the group and predictor variables was not significant ($F(1,18)=1.91$, $p>.05$). The students who focused on their behavior while talking about course effectiveness were more likely to mention their physical self-concept while talking about a change in their self-perception ($r=.67$, for all students).

Table 8.1. Definition of Broad Categories

	BROAD CATEGORY	SPECIFIC CATEGORIES	EXAMPLES OF TOPICS
1	Cognition	• Cognitive Patterns • Cognition/ Thinking Pattern • Learning • Learning and Knowledge • Learning Process	self-esteem, attitude, awareness, concentration, focus, motivation, teacher modeling, knowledge, philosophy, realization and insight
2	Physical Self-Concept	• Physical • Physical Self-Perception • Physical Manifestation • Physiological Response	physical ability, health, general physical well-being, appearance, body tension, change in energy level
3	Emotions	• Emotional • Feelings and Emotions • Affect	Positive emotions, negative emotions, relaxation, fun and pleasure, mood and temper, anxiety, emotional vulnerability
4	Overt Behavior	• Overt Behavior • Exercise and Practice • Daily Behavior • Daily Routine	Food preference, diet, life style, change in schedule, practice, exertion, exercise, Yoga
5	Relationships	• Relationships	Communication style, communication, interpersonal skills, interpersonal comfort, interpersonal contact

Table 8.2. Definition of Topic Areas

	TOPIC AREA	INTERVIEW QUESTIONS
1	Reasons	• Thinking back to the beginning of the semester, why did you sign up for this course? • What did you want to change about your life by signing up for this course?
2	Stress	• How can people around you tell that you are stressed? • How can you tell?
3	Self-Concept	• How do you think you changed physically? • How do you think you changed emotionally? • How do you think people who are close to you tell the difference?
4	Course Effectiveness	• How do you think the course helped? • How can people around you tell if the course is effective? • How can you tell? • What about the course may have helped this change?

Table 8.3. Summary of Responses

			REASONS	STRESS	SELF-CONCEPT	COURSE EFFECT.	ALL TOPIC AREAS
1		COGN.	45	13	33	91	182
	A	Yoga	35	7	16	69	127
	B	Exercise	10	6	17	22	55
2		PHYS. SELF-CONCEPT	55	40	34	46	175
	A	Yoga	18	23	22	29	92
	B	Exercise	37	17	12	17	83
3		EMOTIONS	48	29	25	46	148
	A	Yoga	29	13	18	25	85
	B	Exercise	19	16	7	21	63
4		OVERT BEHAV.	39	13	0	50	102
	A	Yoga	16	2		24	42
	B	Exercise	23	11		26	60
5		RELAT.	10	42	19	16	87
	A	Yoga	6	12	7	10	35
	B	Exercise	4	30	12	6	52

Table 8.4. Correlation Coefficients (r): Reasons and Stress, For All Subjects (N=20).

STRESS	REASONS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	-.01	-.04	.11	-.09	-.20
Physical Self-Concept	.22	-.04	-.14	-.36	.28
Emotions	-.24	.53**	-.46*	.11	-.11
Overt Behavior	-.22	.51**	-.22	-.09	-.20
Relationships	-.16	-.27	-.15	.14	.38

* = p<.05

** = p<.02

✠ = Bonferonni p< .003

Table 8.5. Correlation Coefficients (r): Reasons and Stress, For the Yoga Subjects (N=10).

STRESS	REASONS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	-.09	.08	.06	-.31	-.45
Physical Self-Concept	.16	.12	-.20	-.22	.23
Emotions	-.17	.65*	-.44	.18	.18
Overt Behavior	.37	-.07	-.48	.17	-.08
Relationships	.09	-.34	-.23	-.48	-.03

* = p<.05

** = p<.02

✠ = Bonferonni p< .003

Table 8.6. Correlation Coefficients (r): Reasons and Stress, For the Exercise Subjects (N=10).

STRESS	REASONS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.23	-.25	.26	.55	.13
Physical Self-Concept	.00	-.02	-.22	-.43	.29
Emotions	-.17	.47	-.47	-.10	-.39
Overt Behavior	-.24	.55	-.13	-.33	-.20
Relationships	.53	-.58*	.08	.27	.75**

* = p<.05
** = p<.02
✠ = Bonferonni p< .003

Table 8.7. Correlation Coefficients (r): Reasons and Course Effectiveness, For All Subjects (N=20).

COURSE EFFECTIVENESS	REASONS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.68**	-.32	.03	-.12	.19
Physical Self-Concept	.33	.33	-.17	-.44*	.06
Emotions	.16	-.04	-.13	.10	.00
Overt Behavior	.12	.41	.01	-.16	-.22
Relationships	.32	-.04	-.15	.08	.36

* = p<.05
** = p<.01
✠ = Bonferonni p< .003

Table 8.8. Correlation Coefficients (r): Reasons and Course Effectiveness, For the Exercise Subjects (N=10).

COURSE EFFECTIVENESS	REASONS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.00	-.11	-.20	.05	.29
Physical Self-Concept	-.39	.82**	-.25	-.42	-.21
Emotions	.22	-.13	-.31	.11	-.29
Overt Behavior	-.28	.83**	-.28	-.44	-.40
Relationships	.56	-.44	-.27	.02	.49

* = p<.05
** = p<.01
✠ = Bonferonni p< .003

Table 8.9. Correlation Coefficients (r): Reasons and Course Effectiveness, For the Yoga Subjects (N=10).

COURSE EFFECTIVENESS	REASONS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.63*	-.32	-.10	.03	.08
Physical Self-Concept	.49	-.10	-.26	-.35	.35
Emotions	.09	.27	.05	.17	.53
Overt Behavior	.48	-.40	.41	.13	.11
Relationships	.11	.75**	-.17	.28	.17

* = p<.05
** = p<.01
✠ = Bonferonni p< .003

Table 8.10. Correlation Coefficients (r): Stress and Course Effectiveness, for All Students (N=20).

COURSE EFFECTIVENESS	STRESS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	-.14	.10	-.34	-.14	-.06
Physical Self-Concept	-.32	.36	.15	.29	-.12
Emotions	-.10	-.08	.17	-.30	-.28
Overt Behavior	-.06	-.01	-.10	.57**	-.48*
Relationships	.19	.04	-.08	-.10	-.02

* = p<.05
** = p<.01
✠ = Bonferonni p< .003

Table 8.11. Correlation Coefficients (r): Stress and Course Effectiveness, for the Exercise Students (N=10).

COURSE EFFECTIVENESS	STRESS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.60*	-.45	-.08	-.07	.27
Physical Self-Concept	-.22	-.04	.74***	.49	-.39
Emotions	-.26	-.20	.18	-.35	-.26
Overt Behavior	-.48	.26	.34	.80***	-.69
Relationships	.36	-.02	-.49	-.04	.53**

* = p<.07
** = p<.03
*** = p<.01
✠ = Bonferonni p< .003

Table 8.12. Correlation Coefficients (r): Stress and Course Effectiveness, for the Yoga Students (N=10).

COURSE EFFECTIVENESS	STRESS				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	-.33	.15	-.37	.38	.42
Physical Self-Concept	-.44	.62	-.14	.53	.81***
Emotions	-.07	-.02	.24	.00	-.26
Overt Behavior	.10	-.28	-.49	-.20	-.36
Relationships	.16	.00	.22	.00	-.52

* = p<.07
** = p<.03
*** = p<.01
✠ = Bonferonni p< .003

Table 8.13. Correlation Coefficients (r): Course Effectiveness and Self-Concept, for All Students (N=20).

SELF-CONCEPT	COURSE EFFECT.				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.29	-.29	-.10	.12	.16
Physical Self-Concept	.26	.01	-.12	.67**	-.01
Emotions	.04	.34	-.11	-.34	-.24
Relationships	-.14	.16	.09	-.20	-.23

* = p<.05
** = p<.01
✠ = Bonferonni p< .003

Table 8.14. Correlation Coefficients (r): Course Effectiveness and Self-Concept, for the Exercise Students (N=10).

SELF-CONCEPT	COURSE EFFECT.				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.66**	-.33	.16	-.11	.56*
Physical Self-Concept	-.42	.33	.16	.60*	-.24
Emotions	.03	.40	-.13	-.22	-.40
Relationships	.43	.33	.03	-.17	-.10

* = p<.09

** = p<.05

✠ = Bonferonni p< .003

Table 8.15. Correlation Coefficients (r): Course Effectiveness and Self-Concept, for the Yoga Students (N=10).

SELF-CONCEPT	COURSE EFFECT.				
	Cognition	Physical Self-Concept	Emotions	Overt Behavior	Relat.
Cognition	.24	-.24	-.62*	.53	-.33
Physical Self-Concept	.29	-.27	-.40	.88**	.00
Emotions	-.28	.18	-.22	-.50	-.35
Relationships	-.38	.09	.31	-.30	-.33

* = p<.06

** = p<.01

✠ = Bonferonni p< .003

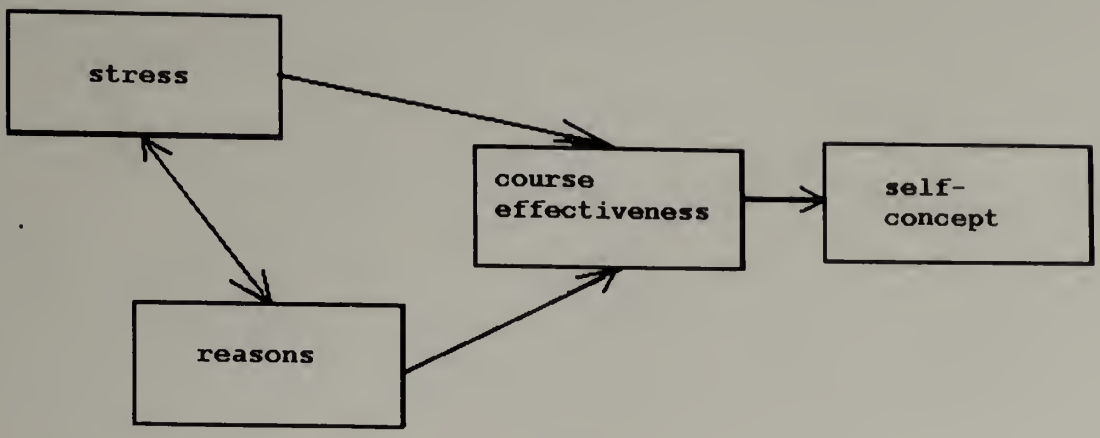

Figure 8.1. Proposed Model of Relationship between the Four Topic Areas: Stress, Reasons, Course Effectiveness and Physical Self-Concept

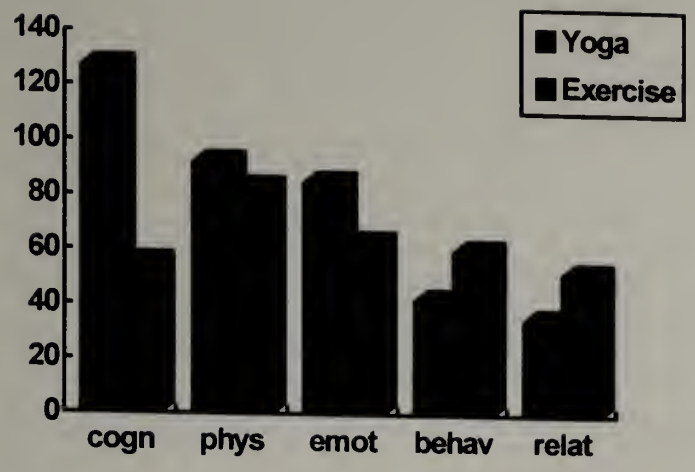

Figure 8.2. Overall Pattern of Responses

Model Stress/Emotions = Constant + Reasons/Emotions + Reasons/Physical self-concept

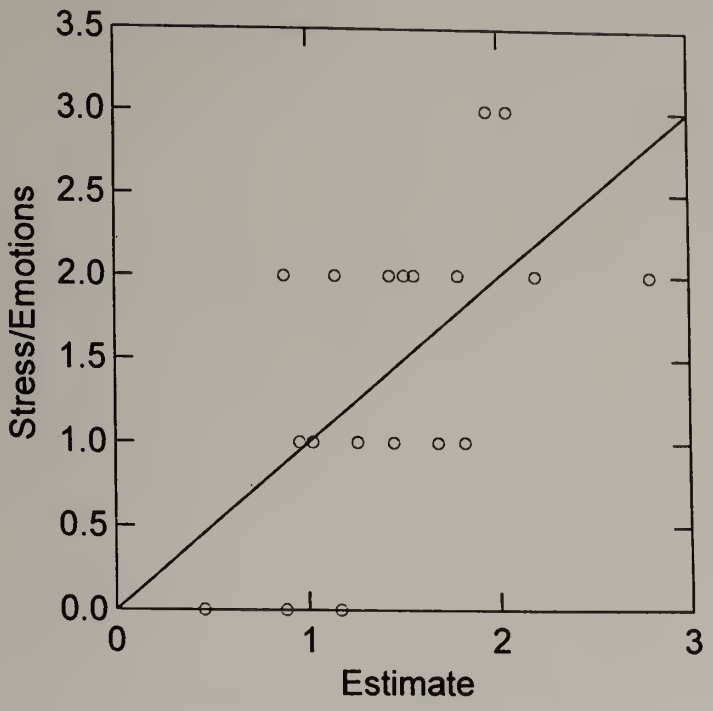

Figure 8.3. Regression Analysis: the Relationship between Reasons and Emotional Stress

Model Reasons/Physical self-concept = Constant + Stress/Behavior + Stress/Emotions

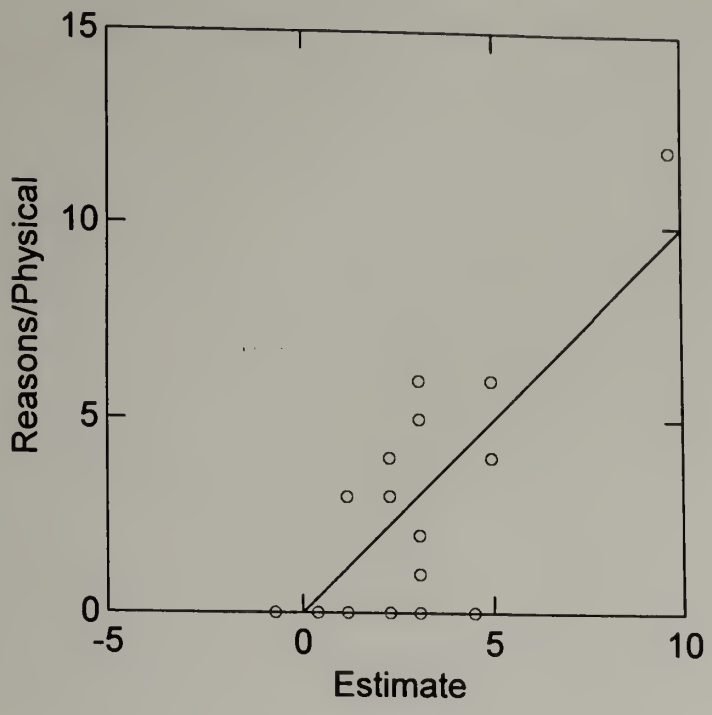

Figure 8.4. Regression Analysis: the Relationship between Stress and Physical Reasons

Model Effectiveness/Cogntion = Constant + Reasons/Cognition

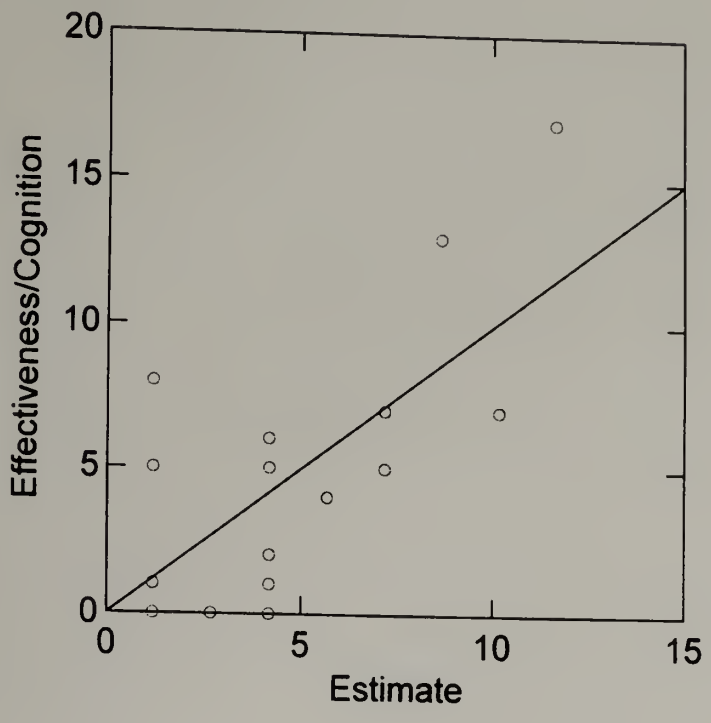

Figure 8.5. Regression Analysis: Reasons and Cognitive Course Effectiveness

Model Reasons/Physical Self-Concept = Constant + Effectiveness/Behavior

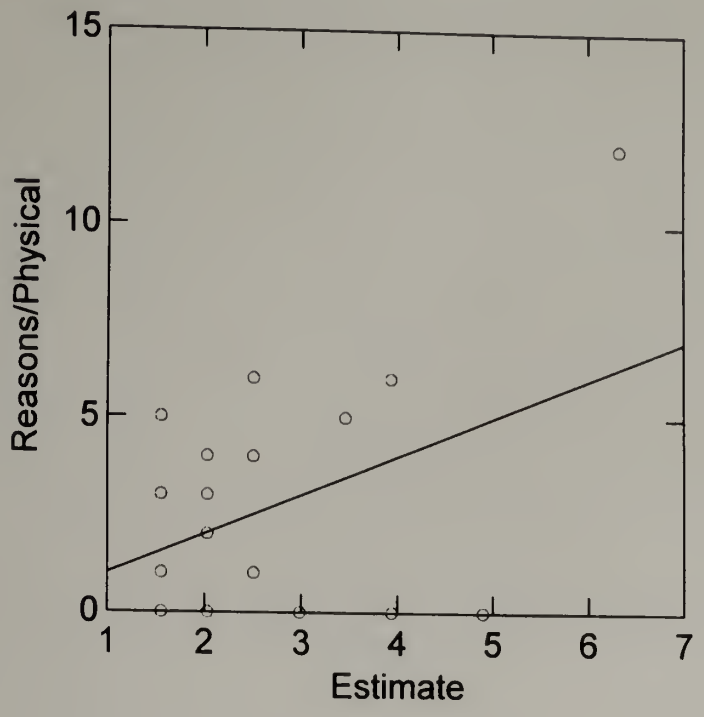

Figure 8.6. Regression Analysis: Course Effectiveness and Physical Reasons

Model Effectiveness/Behavior = Constant + Stress/Behavior + Stress/Relationship

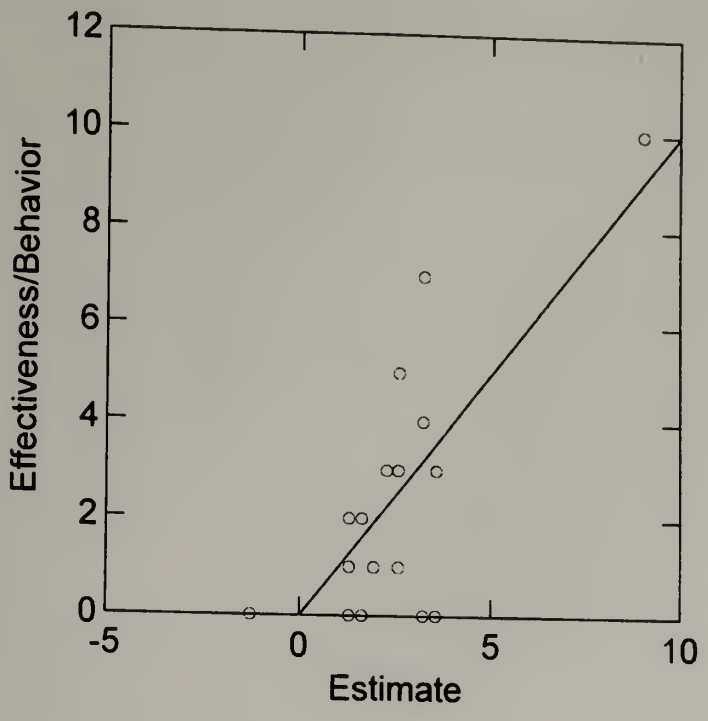

Figure 8.7. Regression Analysis: Course Effectiveness and Stress

Model Self-Concept/Physical Self-Concept = Constant + Effectiveness/Behavior

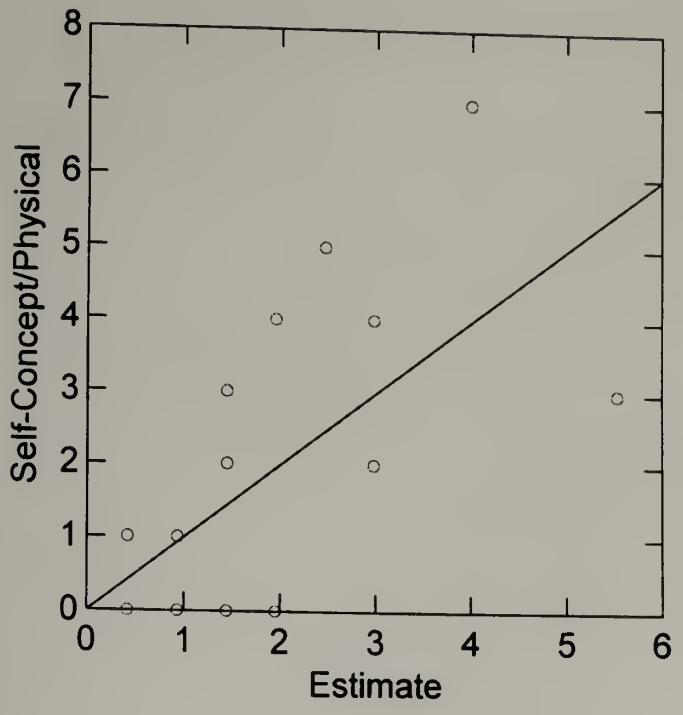

Figure 8.8. Regression Analysis: Course Effectiveness and Self-Concept

CHAPTER IX

DISCUSSION OF STUDY TWO

The results of the qualitative analyses responded to the hypotheses which focused on the subjects' reasons for selecting a course, their experience of stress and their self-concept. The data provided additional descriptive information about these topic areas. Also, the analyses evaluated the subjects' perception of the course effectiveness. Finally, these results allowed the investigator to construct and evaluate a theoretical model of an interaction between stress, expectations and self-concept.

A. Reasons and Expectations

This part of the interview addressed a hypothesis that the Yoga students primarily signed up for their course to improve their well-being, whereas the physical exercise students were motivated by other concerns. This hypothesis was not supported by the interview data.

Contrary to the hypothesis, analyses of the responses showed strong similarities in the motivation of the Yoga and exercise students. First, both groups consistently provided a similar number of responses to these questions. Separate Variance T-test indicated that the Yoga and exercise students responded with similar frequency to the questions which asked about their reasons for selecting a PE course, their expectations

from the course and their evaluation of the course effectiveness in satisfying these goals. Second, describing their motivation, the Yoga and exercise students emphasized the same main themes. The responses from both groups were most frequently related to two categories: "physical self-perception" and "feelings and emotions." In signing up for course, the students in both groups described wanting to improve their health, resolve existing physical ailments and increase their strength, flexibility and endurance. Similarly, the students in both groups described being motivated by emotional reasons, for example, the wish to reduce negative emotions and increase positive emotions, such as pleasure.

Nevertheless, there were significant differences between the groups. While the Yoga and exercise students responded with similar frequency to a particular theme, they often emphasized different topics. First, in discussing the most popular theme, "physical self-perception," the exercise students most often mentioned the wish to increase their physical abilities. They said, for instance, that they selected their PE course to gain strength or increase their aerobic endurance. In contrast, talking about the same theme, the Yoga students emphasized that they wanted to increase their general sense of physical well-being. They were more likely to express a wish to feel more energetic, or raise their muscle tone. Second, the category of emotions was also popular for all students. However, the Yoga and exercise students emphasized different topics within this category. From the Yoga class, participants expected a reduction in negative emotions, such as anxiety or stress, and an increase in relaxation. Participants in the exercise class

at times talked about reducing their negative emotions, but they never mentioned the topic of relaxation. Instead, they focused on increasing their pleasurable experiences.

In addition, the Yoga students at times described whole categories which were unpopular with the exercise students. First, according to the interviews, learning was an important component of the Yoga classes. These students emphasized the need to acquire knowledge in a variety of areas, such as philosophy, relaxation techniques and breathing patterns. Second, the Yoga students talked about their cognition. They expressed a with to improve their cognitive skills, raise their awareness and improve their focus and concentration. In contrast, the exercise students seldom mentioned these topics.

These differences in the students' description of expectations from their courses relate to the difference in their initial attitude, reported in the first study. If all students perceive stress, especially toward the end of the semester, they may seek skills to manage their feelings. Judging by their responses in the interviews, it appears that the Yoga students may represent the population of students who prefer to remain aware of their internal experiences and consciously modulate such processes. Therefore, they may seek new knowledge and techniques for managing their stress-related negative emotions. In contrast, the exercise group may represent the population of students who manage their negative experiences through re-focusing and distraction. Therefore, they would be more likely to focus on externally measured factors, such as physical strength and endurance, and on pleasurable experiences.

B. Students' Experience of Stress

These questions evaluated the hypothesis that all students experienced more stress at the end of the semester. The results supported this hypothesis. Then, the interview provide data validating the hypothesis that the Yoga students felt more stressed than the exercise students. This hypothesis was not supported.

All students overwhelmingly agreed that they experienced stress. A series of Pearson Chi-Square analyses confirmed that such an evaluation was similarly positive for both the Yoga and exercise students. Although the exercise group provided almost twice as many examples of stressful situations, a series of Separate Variance T-test analyses was unable to show significant differences between the groups. Describing their stimuli for stress, all students most frequently talked about the stress of their occupation and school work. Less frequently, both Yoga and exercise students talked about the stress of thinking about the future and the on-going stress of their daily routine. As expected for this research population, all subjects said that these stimuli were especially acute during the time of their final exams.

In describing their experience of stress, the students talked differently about their overt signs and their private, inner cues. Describing the overt signs of stress, the students talked about their behavior in relationships, their display of feelings and emotions, and their physiological responses. For example, they described avoiding friends, acting "snappy" or frustrated, and having more facial acne. Among these themes, "relationships" was the most frequently mentioned category. Talking about their

relationships, students often mentioned their communication style and the quality of their interpersonal contacts. Describing the inner cues of stress, the students mentioned some of the same categories: "relationships," "feelings and emotions" and "physiological responses." In addition, they talked about their cognition and overt behavior. In contrast to the previous set of questions, the students provided the least number of responses for the category "relationships." Instead, they focused on their physiological response to stress, such as a change in sleeping pattern, or a change in energy level.

Repeated-measures ANOVA indicated that the students provided a significantly greater number of examples of their overt expression of stress than of their internal experience. Also, Bonferroni T-test demonstrated a significant difference in the students' emphasis on relationships, while talking about the behavioral signs and while describing internal experience. They frequently mentioned their communication style and interpersonal contact while describing the overt signs of stress, and seldom talked about these topics while describing their inner symptoms.

Also, the analyses suggested that the Yoga and exercise students experience their stress symptoms differently. Repeated-measures ANOVA also indicated a significant interaction between the type of student (Yoga or exercise) and the type of question (behavioral signs or internal experience). The students in the Yoga group provided half as many examples of their behavioral manifestations of stress as the students in the exercise group. While talking about such behavioral signs, they mentioned the relationships half as often. Separate Variance T-test confirmed that these differences were statistically significant. In contrast, the two groups provided a similar number of

responses describing their internal experience. Separate Variance T-test was unable to show a difference between the groups while they talked about their internal experience.

Finally, the students had an opportunity to talk about their common stress-management techniques. They focused on three coping strategies: engaging in a physical activity, distracting themselves, or initiating a goal-oriented activity. It seemed logical that, for the selected population, all subjects most frequently mentioned using physical activity to cope with stress.

The students in both groups reported that they preferred the same strategies for managing stress. A series of Separate Variance T-tests was unable to show any significant differences between the groups. Even describing their use of Yoga and physical exercise, there was little difference between the two groups of subjects. At times, the Yoga students said that they coped with stress by exercising, and other times the exercise students talked about using Yoga or breathing techniques. Also, the students made little distinction between more and less "adaptive" coping strategies. The talked as often about the strategy of "distraction" -- going to a party, drinking coffee and eating -- as they did about goal-oriented activities, such as getting the work done or practicing mental imagery.

The current results clarified the findings in the first study, which tentatively indicated that the subject groups may be distinguished according to their level of anxiety, hostility, somatization and paranoid thinking. That combination of inner arousal symptoms was interpreted as an indication of their psychological stress. Conclusions

from these data proposed that the students became more distressed toward the end of the semester, and that the exercise students were more capable of managing such symptoms.

The current study supported the hypothesis that students experienced greater stress toward the end of the semester, but it was unable to provide data indicating that exercise provides superior coping skills. The Yoga and exercise students provided a similar evaluation of their experience of stress. However, the exercise students provided a greater number responses describing their overt signs of stress, and they talked about having more difficulty in their relationships. Both groups provided a similar number of examples of perceiving stress through inner, private cues. Finally, the students in both groups provided a similar number of examples for managing stress, through physical exercise, distraction or goal-oriented activity. All three types of coping strategies were popular among both groups. Overall, the findings from both studies indicate that all students experience greater stress toward the end of the semester, and the degree of stress is similar for the Yoga and exercise students.

Like the conclusions to the previous section, these results suggest a difference in the cognitive orientation of the two groups. Although both groups have reported to undergo the same degree of stress and they have stated that this stress was driven by similar events, the exercise students are more oriented toward their external experience than the Yoga students. Relying on such findings, one may initially propose that the exercise students are less aware of their emotions. The data provides much evidence which would contradict such a hypothesis. The students in both groups are equally aware of their internal experience. Also, the exercise students reported being sensitive to the

quality of their relationships, while talking about the behavior and while describing their inner life. Overall, these data suggest that, despite their extrovert orientation, the exercise students are as sensitized to their emotions as the Yoga students.

C. Students' Self-Concept

This section of the interviews examined the hypothesis that the students' self-concept changed as a result of engaging in physical activity. The results confirmed this hypothesis, but they also indicated that other events, besides the PE courses, may be responsible for such changes.

The students in all groups stated that their view of themselves changed positively over the course of the semester. Of the nineteen students who made this evaluation, only two Yoga students provided a neutral or negative response. The rest of the students either stated that they changed during the semester, or confirmed so emphatically. Pearson Chi-Square Analysis demonstrated a lack of significant difference in the evaluations made by the two groups.

In describing such changes in more detail, the students talked separately about their physical and emotional changes. First, the interview data showed differences between the Yoga and exercise groups in their description of their physical self-concept. The Yoga students provided twice as many responses to the questions about a change in their physical selves, and Separate Variance T-test demonstrated that such a difference was significant. Subjects in the Yoga group talked twice as often about a change in their

physical abilities, such as flexibility and strength, and their physical attributes, such as weight and posture. Besides such physical changes, the Yoga students also described changes in their cognition and emotions. For example, they were likely to say that their level of confidence in their physical abilities increased during the semester. Less often, they mentioned such emotions as experiencing "the natural high." Responding to the questions about their behavioral manifestations of such changes, the Yoga students stated that they were more likely to exhibit the changes through their physical bodies. The students talked about appearing more muscular, or more in-shape.

In contrast to the statements by the Yoga students, the exercise students seldom mentioned their thoughts or emotions. They stated that they were more likely to exhibit a change in their physical self-concept through their behavior in relationships. For example, the exercise students mentioned communicating more effectively or maintaining more intimate contacts with others.

Nevertheless, there were similarities in the statements made by both groups. All students said that they most often noticed the changes in themselves in the midst of their daily routine. Separate Variance T-test was unable to show a significant difference in the students' description of the stimuli for physical changes. All students talked, for instance, about noticing a difference while putting on their clothes or talking to their friends.

Second, the students talked about the changes in their emotional self-perception. Here, the Yoga and exercise students provided a similar number of examples of the emotional changes, and Separate Variance T-test was unable to find a significant difference between the groups. Most often, the students in both groups talked about

changes in their emotion and cognition. Again, Separate Variance T-test was unable to find a significant difference between the groups in their discussion of these two themes. Discussing their emotions, both the Yoga and exercise students mentioned an increase in their positive feelings. They stated, for instance, that they more frequently experienced joy, pleasure or being carefree. In addition, the Yoga students at times mentioned feeling fewer negative emotions, such as sadness or loneliness. They also talked about being more relaxed. Discussing their thoughts, all students discussed being able to "accept the situation" better or being motivated to set and achieve goals. Behaviorally, for both groups of students, the changes became manifested in a variety of ways: through their actions in relationships, by adapting different patterns of thinking, in their physical appearance or through a display of their affect. All students reported that they most often became aware of the emotional changes during routine, daily events. For example, they noticed remaining calm in daily interactions, or displaying less anger toward others. Separate Variance T-test was unable to demonstrate significant differences in the students description of the stimuli for an emotional change, or its behavioral manifestation.

Finally, the students talked about a variety of events responsible for the changes in their physical and emotional self-concept. The number of such examples was very similar for the two groups. On the average, each students provided two or three examples of influential events, which belonged to such categories as "exercise and practice," "learning process" or "external reasons." The students talked about the importance of a regular exercise routine, about gaining knowledge and about the effect of dramatic unexpected events. However, within these categories, the pattern of responses was

different for the Yoga and exercise students. The Yoga students mentioned the influence of the Yoga postures and breathing techniques, while the exercise students emphasized exertion and working out. Besides exercise and practice, the Yoga students seemed to value the process of learning. They talked, for instance, about reaching realization and insight, about themselves and others. The exercise students rarely mentioned this theme. Instead, they attributed importance to external events, such as a change of seasons and academic success.

These results supported the findings in the first study, which proposed that the changes in the students well-being would be related to their physical self-perception. Specifically, the first study proposed that the students' level of activity and endurance would be positively related to a reduction in their psychological distress. The current study also showed that the students perceived themselves as undergoing both physical and emotional changes. Although the first study provided the data indicating that the exercise students perceive themselves as becoming progressively more active, flexible and in better shape, the current study showed that the Yoga students also noticed a number of changes in their physical selves. The study indicated that the Yoga students talked more often about such physical changes, and that both groups felt that they changed emotionally. Finally, among all the events responsible for such a change, both groups most often described the effects of exercise and practice. However, the data indicated that such changes may not be attributable to the exercise alone. The students talked, for example, about the importance of the change of seasons and the success in their academic studies. Therefore, although these analyses provided additional support to the hypotheses

that the students' well-being is related to their physical self-concept, further analyses may be necessary to make such conclusions with a degree of certainty.

D. Course Effectiveness

The students evaluated their courses as positive and effective, at three different times during the interview. While talking about their reasons and expectations, all students said that the course had achieved their original goals. About a third of the students elaborated by adding "definitely" or "absolutely." Similarly, in discussing stress, the majority of the students found their PE course a positive, "helpful" experience. Approximately a third of the students qualified these evaluations by stating that the course was "very helpful." Finally, in their discourse of their self-concept, the majority of the students stated that the course affected their view of themselves. Nearly twenty percent of the respondents qualified that statement by saying that the course "made a definite difference" in their self-perception. The Yoga students seemed a little more likely to add an emphatic qualifier to their evaluation, especially while talking about stress. However, a series of Pearson Chi-Square analyses was unable to find significant differences between the groups, or between the positive and superior ratings. The course evaluation was consistently positive for both the Yoga and exercise students.

The students provided additional details supporting their claim that the course was effective. It seemed that the course affected the two groups differently. The Yoga students more often talked about the effect on their internal cognitive process and on their

learning. They were more likely to talk about such an internal event as an increased awareness of their bodies. Also, the Yoga students valued the gain in knowledge and the process of learning. They were more likely to talk, for example, about the yogic breathing techniques, which they learned during the course. In contrast, the exercise students appreciated the events which were manifested externally, and which they were familiar with before undertaking their PE course. For example, they more often stated that they benefited from practicing their exercises and exerting their bodies.

However, there were a number of similarities between the Yoga and exercise students. Both groups said that the course helped their relationships. For example, the students' interactions were improved when they could talk to their friends about feeling good. Also, both groups described an effect on their feelings and emotions. They said, for instance, that they felt a greater overall sense of well-being, as a result of attending a PE course. Finally, all students stated that the course affected their physical self-perception. Apparently, the participants in both Yoga and exercise classes began to feel more positive about their physical abilities. Describing such changes, they mentioned, for example, that their knees became stronger and their arm muscles became bigger.

In conclusion, these analyses provided a strong evidence that the students in both groups considered the course effective. Although the first study, discussing its limitations, mentioned that Yoga was taught by a professional instructor and that exercise was taught by undergraduate teaching assistants, the present data has shown that all PE classes were strongly and uniformly effective.

E. Relationship between Topic Areas

The broad analysis of the interview data suggested a number of significant observations. Repeated-measures ANOVA indicated that the topic of discourse significantly affected the number of responses. First, the students most often talked about their cognition. For example, they raised such topics as self-esteem, concentration or motivation. Second, the students were also concerned about their physical self-concept. Describing their PE course, they mentioned an increase in their physical ability, health and appearance. Third, the students' rarely mentioned their relationships. It is logical that the students would seldom expect their PE courses to affect their communication style or their interpersonal skills.

Repeated-measures ANOVA indicated that there was a significant interaction between the group membership and the students' their emphasis on a specific theme. For example, the Yoga students provided twice as many items for the most popular category, "cognition," as the exercise students. The Yoga students consistently talked about learning from their course, or gaining knowledge. Such comments were much less frequent among the exercise students. In contrast, the exercise students more often talked about their behavior. For example, they described establishing a regular exercise routine, or practicing existing skills, such as jogging or volleyball.

Pearson Correlational Analyses did not find direct one-to-one relationships between global topic areas. For example, there was a strong association between the students' mentioning the theme of "cognition" when talking about their reasons for

selecting a course and when talking about the course effectiveness. In contrast, there was a minimal association between the students' mentioning the theme of "cognition" when talking about their reasons for selecting a course and when talking about their stress. Therefore, these data deny support for global statements that would connect whole topic areas, such as "students sign up for their PE courses to reduce stress."

Finally, the analyses suggested a number of connections between specific categories, within the different topic areas. These connections were statistically significant, but they did not lend themselves to an easy, common-sense interpretations. For example, there was a moderate connection between the students' responses within two topic areas, "stress" and "reasons" (see Figure 9.1). Multiple Regression Analysis indicated that the students who manifested their stress through their emotion and behavior were also likely to expect that the course would affect their emotions and physical self-concept. Also, there was a significant relationship between the responses within two topic areas, "reasons" and effectiveness" (see Figure 9.2). Multiple Regression Analysis indicated that the students who signed up for the course to improve their thinking process were also more likely to report that the course affected their cognition. Similarly, the students who signed up to change their behavior were more likely to report that a course affected their physical self-perception. In addition, the analysis suggested a moderate connection between the students' response to two topic areas, "stress" and "effectiveness" (see Figure 9.3). Multiple Regression Analysis indicated that the same group of students who experienced stress through behavioral symptoms and through their behavior also experienced the course as effective in changing their behavior. Last, the analysis

indicated a moderate connection between the students' response to the topic areas "effectiveness" and "self-concept" (see Figure 9.4). Multiple Regression Analysis indicated that the students who experienced the course as effective in changing their behavior were also the ones who felt that they have been able to change their physical self-concept.

This series of regression analyses provide a strong support for the conclusions drawn from the first study. The scores in that study manifested a pattern which indicated that students' experience of stress played in role in their course participation. That study also proposed the existence of an interaction between the students' attitude and their psychological well-being. The current analyses support both of these hypotheses. Although some of the connections drawn by the regression analyses do not lend themselves to clear logical interpretation, overall they indicate a series of significant relationships between the topic areas of "stress" and "reasons," between "stress," "reasons" and "course effectiveness," and between "course effectiveness" and "self-concept." The latter relationship seems particularly important. It lends significant statistical support to the initial hypothesis for this project, which stated that physical activity would benefit students through a change in their physical self-concept. Here, of the five categories available within the topic area of "self-concept," the regression analysis showed a direct connection to the single category of "physical self-perception."

F. Limitations

In drawing conclusions from these qualitative analyses, it would be important to emphasize at least five important limitations. First, these analyses were descriptive and correlational. The selected method of research precluded an ability to infer connections between cause and effect. The data described a psychological state of a particular group of students, at a particular moment within their academic year. Second, some of data was retrospective. For example, since the students were interviewed at the end of the semester, it was likely that their recollection of the original reasons for selecting the course was influenced by their later impression of its effectiveness. Third, the analyses were based on the total scores for the categories, which made it difficult to interpret the positive or negative direction of the correlational analyses. For example, the category of "emotions" included both the statements that the students wanted to feel less anxious, and the statements that they wanted to have more fun. Therefore, the score for this category could be interpreted as a measure of the students' awareness of their emotions, and not as a measure of their emotional distress. Fourth, the analyses included data from only twenty students. Although they participated in lengthy interviews and provided over 700 individual statements, only the most popular categories contained a sufficient number of items to be included in statistical analyses. Analyzing the responses to individual questions, Separate Variance T-test was used only with the most frequently mentioned categories. Finally, a number of external events may have influenced the findings. For example, the results determined the importance of physical self-concept to the selected

group of students. However, the interviews were conducted during late spring, and as the students were exchanging their winter wardrobe for lighter, more revealing summer clothes they may have become more sensitive to their appearance. Therefore, as some interview responses indicated, a change of seasons may have also been responsible for some of the changes in students' physical self-concept.

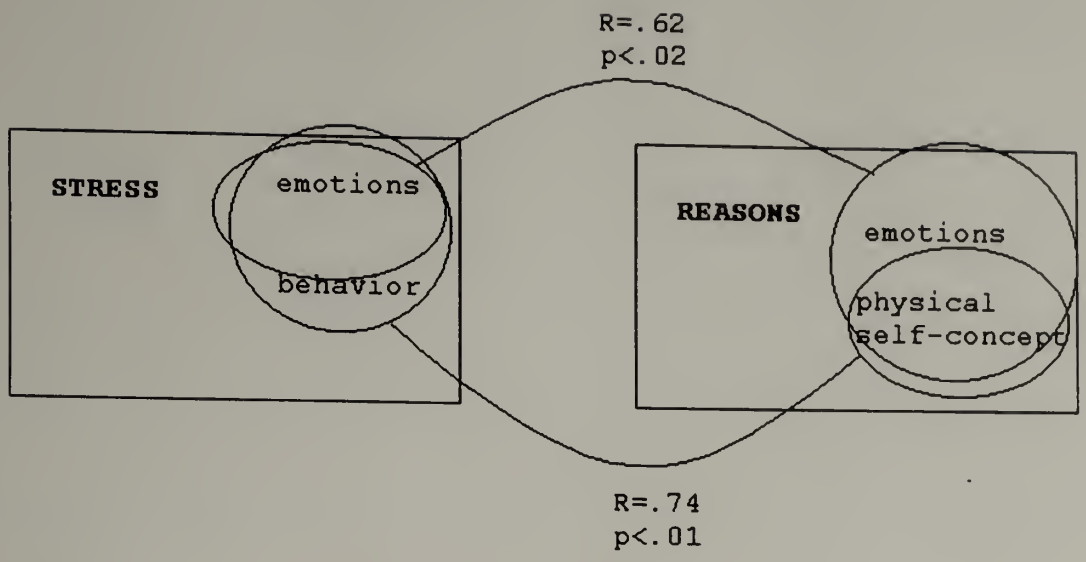

Figure 9.1. Relationship between Stress and Reasons

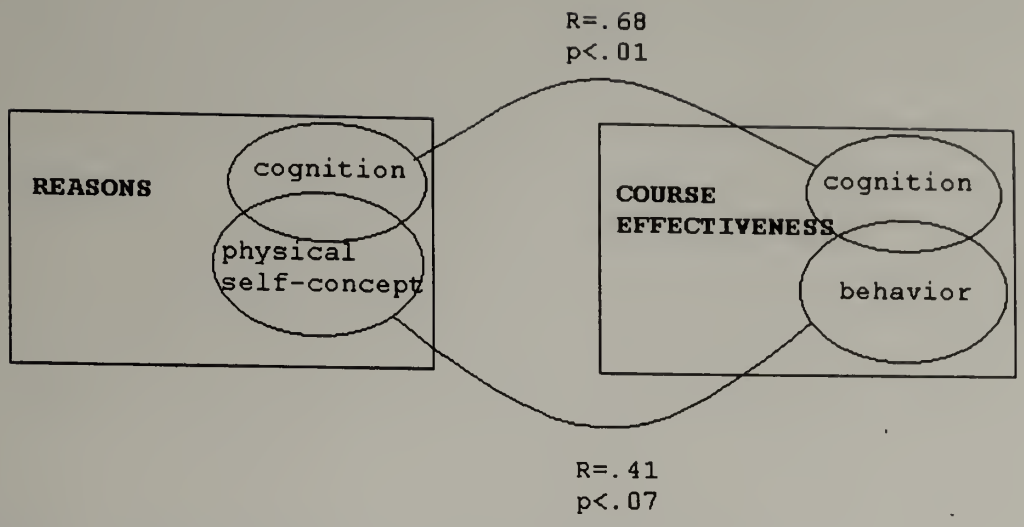

Figure 9.2. Relationship between Reasons and Course Effectiveness

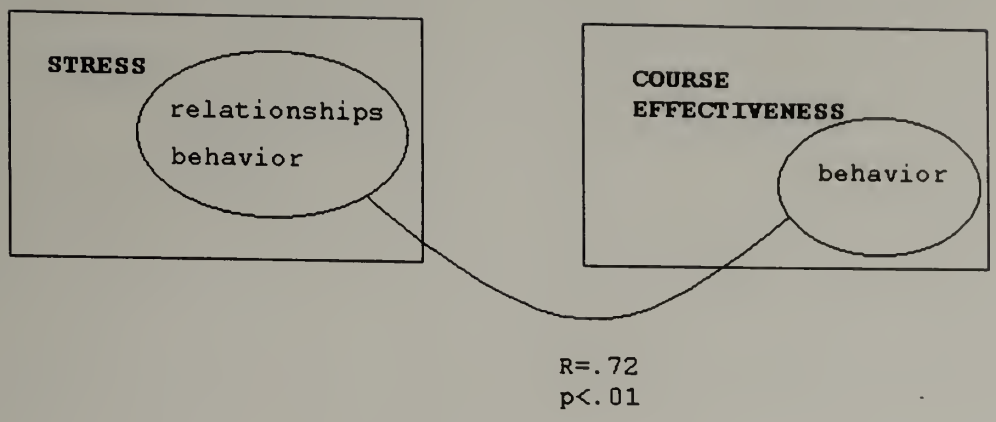

Figure 9.3. Relationship between Stress and Course Effectiveness

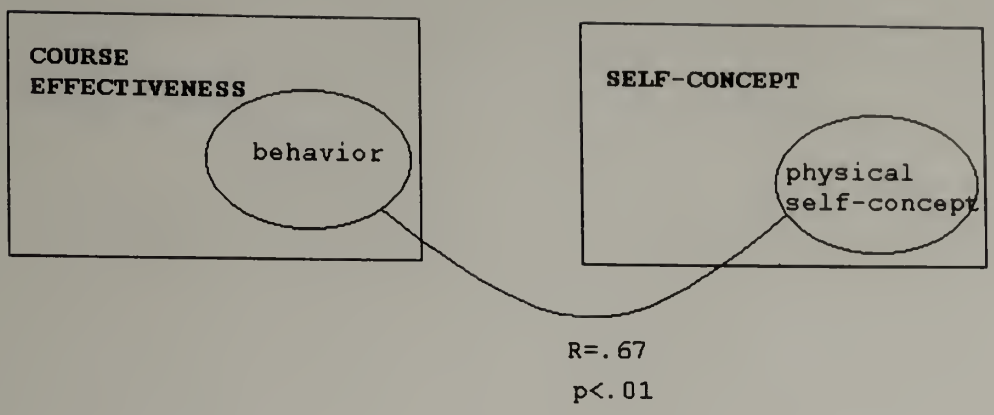

Figure 9.4. Relationship between Course Effectiveness and Self-Concept

CHAPTER X

FINAL DISCUSSION

This discussion integrates the results of two separate investigations: a quasi-experimental study with ninety seven undergraduate students and a series of structured interviews with twenty students. First, three equivalent groups of students were assessed at the beginning and the end of the semester, using five validated questionnaires that measured their psychological distress, physical self-perception, worry, self-esteem and life satisfaction. The results showed that, at the beginning of the semester, the subjects in the Yoga, exercise and control groups provided similar scores on the SCL-90R, PSDQ, Penn State Worry Scale, Rosenberg Self-Esteem Scale and Hassles and Uplifts Scale. Also, a medical questionnaire confirmed that the students were generally healthy, in all three groups. Then, the Attitude Scale, which was designed for this project, suggested that the subjects in the three groups held different expectations from their activity. The Yoga students were the most motivated toward improving their well-being; the control students, who were enrolled in a psychology lecture, were the least motivated. Second, the comparison of the scores collected at the beginning and the end of the semester provided contradictory results. An initial comparison of the "pre" and "post" measures indicated that the students' psychological well-being remained unchanged. However, post-hoc analyses suggested systematic differences between the groups on the measures of anxiety, hostility, somatization and paranoid thinking. Also, the exercise students

began to view themselves as more active, flexible and in-shape. Finally, correlational and regression analyses suggested that the positive psychological changes may be related to an improvement in subjects' level of activity and endurance.

The review of these empirical findings suggested four topics for further research: reasons for selecting a particular course, experience of stress, changes in physical and emotional self-concept and, finally, the effectiveness of each course in bringing about such changes. At the end of the next academic semester, twenty students were selected from the Yoga and exercise courses to participate in structured interviews. Qualitative analysis of the interview data supported five broad conclusions about the students' experience of participating in regular physical activity. First, the data was unable to show the difference in the degree of motivation between the Yoga and exercise students. It indicated that, to maintain regular exercise during an academic semester, all students had to exhibit a similar, high level of motivation. Second, the qualitative analysis supported the hypothesis stating that all students experienced more stress at the end of the semester, but it was unable to show that the exercise students coped with such stress better than the Yoga students. Third, the analysis confirmed that the students' self-concept changed as a result of engaging in physical activity. However, the data indicated that other events, besides the PE courses, may be responsible for such changes. Fourth, the interview data showed that the students in both groups consistently evaluated their course as highly positive and effective. Fifth, the broad analysis of the data suggested a model of interaction between the four topic areas and, also, proposed that the positive effectiveness of the courses is related to the changes in the students' physical self-concept.

A. Course Effectiveness

Opening this discussion, it seems necessary to emphasize the importance placed on physical activity by the selected groups of students. As any psychological or medical procedure has a degree of success and failure, it seemed reasonable to expect that the students would express at least occasional disappointment with their courses, or that some students would attribute little psychological significance to attending the classes. Also, the Yoga classes were consistently over-subscribed, and they were taught by a professional instructor who openly communicated her degree of personal commitment to this discipline. In contrast, the exercise courses, which included running, weightlifting, aerobics, volleyball and general conditioning, were taught by undergraduate instructors who communicated a more casual approach to their courses. It seemed likely that the Yoga students would rate their course as more effective, because of the presence and influence of a professional instructor.

Instead, the students in both groups consistently rated their PE courses as positive and effective. In addition, making a general evaluation of the course, twenty to thirty percent of the time the students added a superlative clarifier, stating that it was "definitely" or "absolutely" effective. Describing their expectations of the courses, the students stated highly personal goals, such as a change in their view of themselves or a reduction in the frequency of depressive and anxious feelings. All the students (100%) stated that these expectations were satisfied. Then, talking about their experience of

stress, they named exercise and practice as the primary stress coping technique. Also, they stated that exercise and practice were the primary events responsible for the changes in their self-concept which they were aware of on a daily basis, during interactions with others or while spending the time alone. There were no significant differences between the Yoga and exercise and groups in emphasizing the importance of physical activity, as opposed to other events.

Throughout the interviews, the students were asked to elaborate their statements and to provide specific, behavioral examples. Describing the effects of the course, the students talked about the changes in a wide range of their functioning: their cognition, emotions, self-concept, daily behavior and relationships. Statistical analysis suggested that the topic of cognition was mentioned significantly most frequently. The students talked, for example, about their improved concentration, increased knowledge and greater motivation.

In evaluating their courses, the Yoga students were at times more positive than the exercise students. On a self-report attitude scale, they rated these PE courses as important as their other academic work, whereas the exercise students provided significantly lower ratings. In describing the effect of the course on their cognition, they provided three times as many items as the exercise students. Statistical analysis confirmed that such an interaction effect was significant. However, such differences were less frequent than the similarities between the two groups. A series of Pearson Chi-Square analyses were unable to show significant difference between the two groups in the intensity of their

evaluation. Overall, the data suggested that all students who participated in a PE course seemed to value that time as highly effective and beneficial.

B. Model of Interaction between Expectations, Stress and Self-Concept

A broad analysis of the interview data allowed the investigator to suggest a series of logical connections between the students' expectations from the course, their experience of stress and the changes in their self-concept, as they engage in physical activity. The initial hypotheses about these connections were graphically illustrated in Figure 8.1. In this diagram, four graphical figures represented the four logical areas of "stress," "reasons," "course effectiveness" and "self-concept." The model included arrows connecting these figures, which symbolically represented the relationships between these four topic areas.

The connections between the students' experience of stress, their expectations and the changes in their self-concept were founded on the hypotheses guiding the structured interviews. These hypotheses suggested that the Yoga students signed up for their course to improve their well-being, and that the Yoga students may feel a greater degree of stress than the exercise students. Therefore, the model showed a bi-directional arrow connecting the areas "reasons" and "stress." Second, the hypotheses stated that the students' self-concept changed as a result of engaging in a physical activity. Therefore, the model included an arrow connecting "course effectiveness" and "self-concept." Finally, the interview questioned at separate times whether the course was effective in

satisfying the original goals and in managing stress. Therefore, the arrows were drawn from "reasons" to "course effectiveness" and from "stress" to "course effectiveness."

The model was verified using a series of Pearson Correlational Analyses and Multiple Regression Analyses. It supported two main conclusions (Figure 10.1). First, there were significant relationships between the four topic areas. However, such relationships were complex, and not a direct one-to-one correlation. The analyses were consistently unable to super-impose the categories within one topic area onto the same set of categories within a different topic area. For example, there was a strong association between the students' mentioning the theme of "cognition" when talking about their reasons for selecting a course, and when talking about the course effectiveness. In contrast, there was a minimal association between the students' mentioning the theme of "cognition" when talking about their reasons for selecting a course, and when talking about their stress.

Despite a lack of one-to-one correlation between whole topic areas, the analyses inferred some less predictable connections. For example, Multiple Regression Analysis suggested that the students who manifested their stress through their emotion and behavior were also likely to expect that the course would affect their emotions and physical self-concept. In another example, the analysis implied that the same group of students who experienced stress through behavioral symptoms and through their interactions in relationships also experienced the course as effective in changing their behavior. Overall, these data did not support global statements that would connect whole

topic areas, such as "students sign up for their PE courses to reduce stress." Instead, the data suggested a complex, but significant set of relationships between the four topic areas.

Second, the model suggested that the course affected the students' self-concept by raising their physical self-perception. The responses to other categories, such as "emotions" or "behavior," were not related to the topic area "course effectiveness." Instead, the analysis suggested that the students who were able to change their behavior by attending a PE course were also likely to view themselves as stronger, healthier or more attractive. This relationship was highly significant, and it supported the original hypothesis that physical activity may benefit the students by affecting their physical self-concept.

The relationships proposed by the model supported the early conclusions, drawn on the basis of the published research on physical exercise. On the one hand, the current project upheld the statements by previous authors that physical activity brings about significant psychological benefits (ISSP, 1992; Kirkcaldy & Shephard, 1990; Kerr & Vlaswinkel, 1990; Martinsen, 1987). On the other hand, the current study supported the critics who expressed a doubt about the effectiveness of physical activity in alleviating psychological disorders or changing stable personality traits (Agnew & Levin, 1986; Berger & Owen, 1992; Gauvin, 1989; Gleser & Mendelberg, 1990; Leith & Tailor, 1990). The current model implied that, by affecting a person's physical self-concept, the process of physical exercise may influence the overall self-perception. A person may feel more energetic, view own body more positively and experience a higher sense of well-being, especially immediately following the exercise. At the same time, the person may

continue experiencing some of the more enduring symptoms associated with stable personality traits, such as anxiety, worry or depression.

C. Students' Subjective Experience of Engaging in Exercise

Besides drawing a model of interaction between the main topic areas, the quality analysis of the interview data also described the students' subjective experience. These results suggested both differences and similarities between the experience of the Yoga and exercise students. Based on these data, conclusions were drawn about the three hypotheses that were proposed in the first, quasi-experimental study.

1. Hypothesis One

First, the qualitative analysis addressed the hypothesis which stated that the Yoga students primarily signed up for their course to improve their well-being, whereas the exercise students were motivated by other concerns. This hypothesis was based on the empirical data indicating that the Yoga and exercise students were significantly different in their motivation and attitude. At the beginning of the semester, the Attitude Scale asked the students to compare their PE course with other academic course. The Yoga students' ratings were higher than the scores of the exercise students but similar to the scores of the control group, who were enrolled in a required psychology lecture. In contrast, the exercise students provided significantly lower ratings than the other two

groups, suggesting that their PE course was less important than the rest of their academic work. Also, Item Analysis of the scale showed that a total score of four selected items may be used as an indication of the students' motivation to improve their well-being. Statistical analysis of these scores indicated that the Yoga students approached the course with a stronger motivation to improve their well-being than the exercise students. Finally, in an open-ended question, the Yoga students were more likely to express a wish to use the course for stress management or relaxation. Such statements were rare among the exercise students.

The results of the qualitative analysis did not support the original hypothesis. On the contrary, the data suggested a number of similarities in the students' motivation to enroll in a PE course. The Yoga and exercise students seemed motivated to the same extent. They expressed the same number of reasons for selecting a course, and they emphasized similar, deeply personal concerns. Most often, all students expressed a wish to view their physical selves more positively. Within this theme, they talked about a need to improve their health, resolve existing physical ailments and increase their strength, flexibility and endurance. In addition, the students in both groups expressed a wish to feel better emotionally. They talked about increasing the frequency of positive emotions and decreasing the incidents of anxiety, stress and depression.

However, as the hypothesis suggested, there were some differences in the attitude of these groups. The Yoga students were more likely to seek learning and knowledge and to focus on cognitive skills. For example, they wanted to learn new philosophy or acquire greater self-awareness. Also, to manage their emotions, the Yoga students sought to

increase the incidents of relaxation and to reduce stress. In contrast, the exercise students were unlikely to mention learning or cognition, but instead they focused on their wish to gain pleasure.

These results suggest that a high level of motivation is required of all students to sustain regular physical activity during an academic year. For all students, the most common reasons for maintaining an exercise routine are to raise physical self-concept and manage negative emotions. However, there may be different groups of undergraduates who are more likely to select a Yoga class, as opposed to a traditional exercise course. To enroll in Yoga, the students are likely to be more interested in learning about a new discipline. They may also want to master the techniques that teach specific cognitive and relaxation skills. In contrast, the exercise students are less likely to seek knowledge and cognitive skills in their selection of the course. They are as aware of their emotions as the other group, but they tend to focus on the positive and pleasurable spectrum of feelings.

2. Hypothesis Two

Second, the analyses addressed the hypothesis that all students were experiencing more stress toward the end of the semester but the exercise students were coping better with such experiences than the Yoga students. Empirical data derived from the first study provided contradictory results on the topic of stress. On the one hand, there was a strong evidence that the students' psychological state remained the same for the duration of the three months of the study. The students in all three groups scored the same on the self-

reports which measured a variety of their experiences: their level of symptomatology, physical self-perception, general life satisfaction and degree of worry. On the other hand, post-hoc analyses indicated that all students scored significantly higher on the measures of anger and hostility toward the end of the semester. Also, the students reported becoming less active and experiencing fewer positive daily events. In addition, there were some significant differences between the groups toward the end of the semester. The Yoga group scored significantly higher than the exercise group on the measure of somatization, indicating that they began to express greater psychological distress through physical symptoms. In contrast, the exercise students scored higher than the control group on the measures of activity, flexibility and endurance, suggesting that they began to view their physical abilities more positively.

The results of the qualitative analysis confirmed the first part of the hypothesis and contradicted the second. The interview data suggested that all students experienced stress, especially during the final exams. All subjects strongly agreed with the question which asked whether they felt stressed. As they elaborated on that topic, their responses showed that the experience of stress was similarly intense for the Yoga and exercise students. A series of statistical tests was unable to find significant differences between the Yoga and exercise groups in the extent of their evaluation of stress experience. All students reported that, most often, such stress was caused by their occupation and school work. It was felt most acutely during the time of the final exams. The students said that they assessed their own experience of stress by their behavior in relationships, their emotions and their physiological responses. They reported differences in their observable

signs of stress and in their more subjective, inner cues. It appeared that stress most commonly affected the students' overt behavior by changing their interactions in relationships. For example, the students became more abrupt in their communication style and more reserved in their interpersonal contacts. In contrast, stress most frequently affected the students' subjective experience by provoking uncomfortable physiological responses, such as a loss of sleep or a decrease in energy level.

In both Yoga and exercise groups, the students described physical activity as a primary technique for coping with stress. All students said that they used both traditional forms of exercise and more alternative activities, for example breathing, stretching or Yoga postures. Interestingly, there was little difference between the two groups in their use of Yoga and physical exercise. At times, the Yoga students said that they coped with stress by exercising, and at other times the exercise students talked about using Yoga and breathing techniques. In addition, besides exercise, they talked about distracting themselves by going to a party, or engaging in a goal-directed activities, such as practicing mental imagery. They made little distinction between the more adaptive skills, such as meditation and focusing on work, and the less adaptive skills, such as seeking distraction in partying.

Although these analyses showed that all students exhibited similar signs of stress, the data also implied that the two groups differed in their subjective experience. The exercise students appeared more aware of the external signs of stress than the Yoga students. Statistical analysis indicated that the exercise students spoke significantly more often about the behavioral manifestations of stress. In contrast, both groups provided a

similar number of examples of the internal experience. Statistical analysis indicated the significance of an interaction effect between the type of group (Yoga or exercise) and the orientation toward stress (behavioral signs or internal experience). These results supported earlier conclusion about the difference in the cognitive orientation of the two groups. The exercise students were more oriented toward their external experience than the Yoga students. However, the students in both groups had a similar degree of awareness of their internal experience, including their feelings, emotions and physiological signs of stress.

These results imply that, indeed, all students experience a greater degree of stress toward the end of the semester. Second, the results indicate that the intensity of this experience is similar for the Yoga and exercise students. Third, the results propose that the two groups differ in their cognitive orientation toward their internal experiences. The interview data show that the exercise students are more likely to pay attention to external events. However, they report noticing their feelings, emotions and physiological events as often as the Yoga students. Such a pattern of findings, as well as the previously reported differences in the students' attitude, suggest that the exercise subjects comprise a more extrovert group, and the Yoga subjects comprise a more introvert group of students.

For the Yoga students, such an introvert orientation is, probably, encouraged by spending time in the quiet, introspective environment of a Yoga class. At these classes, the students are asked to follow specific instructions in attending to their physical sensations. Such differences in attention to the inner experience may explain the higher self-report scores of the Yoga students provided in the first study, especially toward the

end of the semester. However, it is likely that, over a course of time, greater awareness of such inner experiences may allow the Yoga students to develop more flexible and effective stress-management strategies. For example, scientifically validated treatments of anxiety require that the patients adopt an attitude of "a behavioral scientist" in observing their internal experiences (Barlow, 1988). Such an attitude facilitates the development of more effective skills for managing anxiety-provoking experiences. Although the methodology of the current study does not allow for conclusions beyond the realm of an academic semester, it remains a question for further research whether Yoga may bring about greater long-term benefits than traditional exercise.

3. Hypothesis Three

Third, the analysis focused on the hypothesis that the students' self-concept changed over the course of the semester, as a result of engaging in a physical activity.. In approaching this topic area, the investigator relied on the theory that a person's definition of self is composed of independent domains (Fox & Corbin, 1989; Marsh, Richards, Johnson & Roche, 1994). These authors suggested the existence of such domains as "social," "academic," "emotional" and "physical." This theoretical model implied that a person's overall self-perception may result from a combination of four independent assessments, in four independent spheres of functioning. For example, a person's overall sense of well-being may increase with an achievement of social or professional recognition. Similarly, a person may simultaneously experience a negative social

encounter and a positive physical event, leaving the balance of an overall well-being unchanged. According to this theory, the information is arranged hierarchically within the four main domains. In designing their Physical Self-Description Questionnaire (PSDQ), Marsh et al. (1994) have identified eleven individual sub-scales, such as "health," "appearance" and "endurance." According to their theoretical approach, a person's perception of self as healthy would contribute to the overall physical self-concept. In turn, the physical self-concept would contribute to the person's global self-assessment. Also, a person's perception of self as healthy would exist independently of a person's concept of self as socially adjusted or academically successful. Nevertheless, an increase in the perception of self as healthy or attractive would increase the global sense of self-worth.

Relying on such a theoretical approach, the investigator suggested, at the onset of the current project, that the realm of physical self-concept would be most affected by an engagement in regular physical activity. This initial hypothesis was based on the ethnographic evidence which draws a connection between mind states and physical well-being (Moyers, 1993). The empirical data from the first study provided additional evidence that the changes in the students' physical self-concept were significantly related to an increase in their psychological well-being. These conclusions were based on a series of correlational analyses which tested separately the data from the Yoga, exercise and control groups. The analyses tentatively indicated that the students' self-report of activity, endurance and attractiveness were related to their scores on anxiety and somatic symptoms. Then, Multiple Regression Analysis tested the model which predicted that the

subjects' scores of activity and endurance would be related to a reduction in the intensity of their symptoms. The analysis confirmed that such a connection was statistically significant.

In talking to students about their self-concepts, the interviews focused on two domains, emotional and physical. The analysis used a definition similar to the model proposed by Marsh et al. (1994) to score the students' report of their physical changes. The category of "physical self-perception" included a number of independent sub-topics, such as ability, health and general physical well-being. The students received a score in this category if they mentioned, for example, their appearance, strength, pain or muscle tone. Similarly, the analysis used a hierarchy labeled "feelings and emotions." This category contained a number of sub-topics, such as positive emotions, negative emotions and relaxation. For example, the students received a score in this category if they mentioned fun, anxiety, stress or calm.

The results of the qualitative analysis confirmed the hypothesis that physical activity was related to a change in students' self-concepts. The students in both groups stated that their view of themselves changed positively over the course of the semester. Then, they talked in more detail about their physical and emotional changes. Within these topic areas, the interview data suggested some differences between the Yoga and exercise students.

First, describing their physical self-concept, the Yoga students specified a significantly greater number of changes than the exercise students. The Yoga subjects focused on the changes in their physical bodies and, also, on the improvement in their

thinking and emotions. Among such physical changes, they talked about a progress in their flexibility, strength, weight and posture. They also talked about an increased confidence and an experience of "natural high." In contrast, the exercise students provided fewer examples of changes in their physical selves, and they seldom mentioned their thinking or emotions. They were more likely to talk about the changes in their relationships, such as more effective communication skills. Overall, it seemed that the Yoga students perceived a greater change in their physical self-concept, during the semester, than the exercise students.

Second, describing their emotional self-perception, the Yoga and exercise students provided a similar number of examples. Statistical analyses were unable to show significant differences between the two groups in their description of their emotional changes. Both the Yoga and exercise students described an increase in positive feelings. In addition, the Yoga students at times mentioned negative emotions, such as sadness or loneliness. The students in both groups equally often talked about their cognition, such as a change in their attitude or an increase in motivation. Overall, it seemed that the changes in the emotional domain occurred similarly for the two groups of students.

Third, the students talked about the source of such changes. All students most often attributed such physical and emotional changes to the effect of exercise and practice. However, a number of other events were also mentioned. The Yoga students seemed to value the process of learning, while the exercise students attributed importance to external events, such as a change of seasons and academic success.

Previously, the results of the regression analyses, conducted in the empirical study and in drawing the model for the interview data, selected physical self-concept as the essential component of the overall self-concept. However, in the present analyses, the students talked about their emotions as readily as they mentioned their physical changes. The combination of such findings supports the importance of physical self-concept but also cautions against making a strong causal connection between the students' attendance in their PE course and the reported changes in self-perception. Full-time undergraduate study is an activity which is aimed at making changes in the students' self-concept. Developmentally, students are considered adolescents, as they enter their course of studies (Grayson, 1989). By the end of their senior year, they are expected to view themselves as capable of fulfilling adult, professional roles. In the current interviews, the students attributed the changes during the semester to a variety of events, including "learning" and "academic success." Although a pattern of results provided by the current studies points toward a significant connection between physical activity and physical self-concept, it is important to observe the caution against drawing overly optimistic conclusions about the capacity of exercise, made by previous authors (Emery & Blumenthal, 1991; Gauvin, 1989; Gleser & Mendleber, 1990; Leith & Taylor, 1990; Otto, 1990).

D. Summary

The current project supports five broad conclusions about the psychological effects of physical activity, both exercise and Yoga. First, the data has confirmed that

regular physical activity is a positive experience for female undergraduate students. By engaging in a PE course, the students are able to make a conscious change in their emotional experience, improve their view of their physical bodies, enhance their cognitive skills and enhance their relationships. Second, the data has shown a lack of significant difference in the effectiveness of the Yoga and exercise courses. The students describe both types of courses as consistently positive. Third, qualitative analysis of the interviews has indicated that stress, personality style and expectations from the course are the most important factors affecting the students' engagement in physical activity. The students' prior level of stress may motivate them to enroll in a PE class. Also, the students' tendency to focus on external events may make them a more likely candidate for a traditional exercise course, whereas a more introspective personality style may make them a better candidate for Yoga. However, the highly stressed students who select a PE course to manage their negative emotions are less likely to show psychological benefits by the end of the semester. Fourth, the positive psychological effects of physical activity are related to an improvement in physical self-concept. As the students begin to view themselves as more active, flexible and in-shape, they begin to feel better overall. Finally, the format of an hourly PE course is unlikely to cause changes in the students' enduring psychological traits. Although the students may have a greater sense of well-being following the exercise, they are not likely to show a significant improvement in their symptoms of depression, anxiety or somatic disorders.

E. Limitations

The conclusions of this project are limited, first of all, by its scope. It was conducted by a single investigator, who was a graduate student at a large state university, with the help of two undergraduate research assistants. Therefore, its subjects included the available population of undergraduate students at the same university, over the course of one academic year. Ninety seven subjects volunteered for the first study, both male and female. However, because fewer men attended the Yoga classes, their data was eventually excluded from the analyses. The second study was based on twenty volunteers, who were all female. In addition, the selected methodology precluded drawing any causal conclusions from the available data. Therefore, the results may be used to accurately describe the experience of a particular cross-section of female undergraduate students, who attended a state university PE course at the end of a spring semester. It may be possible, although not likely, that male students attending a small private college, at a different time of the year, may report a different set of experiences.

Nevertheless, this project made an effort to respond to the criticism of the existing body of research on the psychological benefits of physical exercise. First, it abstained from evaluating the subjects' overall well-being. Instead, the investigation focused on specific psychological constructs, such as "cognition," "anxiety" or "physical self-perception." Second, the study used psychological instruments which assessed the subjects' enduring traits, as opposed to their more transient mood states. In selecting self-report instruments, it intentionally employed the measures which were thoroughly

validated in previous studies. Finally, this project made an effort to add to a limited number of empirical investigations into the effects of Yoga. Although it used quasi-experimental and qualitative methods of research, it made every effort to validate the conclusions by including estimates of inter-rater reliability and providing alternative interpretations.

F. Clinical Implications

Traditionally, some disparity exists between the academic psychological research and applied clinical practice. At times, clinical techniques are taught and practiced in spite of the available research. Clinical hypnosis provides such an example. Hypnosis is currently practiced in individual psychotherapy and in traditional medical settings, such as in assisting in preparing anxious patients for surgery (Hilgard & Hilgard, 1975). In 1980, shortly before the death of Milton Erickson, an influential advocate of hypnosis, a congress on hypnosis and psychotherapy was attended by two thousand clinicians (Lankton & Lankton, 1983). The practice of hypnotherapy continues despite continuos criticism from the academia, especially from a number of established social psychologists (Sarbin, 1991; Spanos, 1992). These psychologists convincingly argue, with the use of experimental data, that the influence of hypnosis is a direct result of the atmosphere of occult and mysticism, which continues to surround its practice.

Similarly, a number of published articles advocate the application of Yoga in clinical setting, despite the deficit of supporting empirical evidence. For example, Nespor

(1993) describes using Yoga with psychosomatic, schizophrenic, anxious and depressed patients. He also advocates applying these techniques for alcohol and drug abuse rehabilitation. Similarly, in India, relaxation techniques based on Yoga have been employed for treating anxiety and depression (Broota & Dhir, 1990). With medical disorders, yogic techniques have found an application in treating asthma, stress and cardiovascular disorders and hypertension (Cusumano & Robinson, 1992; Jain, Rai, Valecha, Jha, et al., 1991). Latha and Kaliappan (1992) describe teaching Yoga to migraine headache patients, for whom traditional drug treatments are rarely effective.

Reviewing this body of evidence, one must acknowledge that these authors have witnessed the effect of Yoga and believe that it is beneficial. According to their clinical judgment, these authors consider these procedures effective and beneficial. On the other hand, one may consider a possibility that, while applying Yoga techniques in the psychiatric and medical settings, these clinicians create powerful, explicit expectations that the patients would improve. In a recent experimental study, reviewed in the introduction to this project, the authors equate such "expectancy manipulation procedures" with a placebo effect (Desharnais et al., 1993). They argue that the expectation to feel better is present in all psychological interventions. They view such placebo effects as "a powerful psychological mechanism in itself" (p. 149). Using an experimental design, the authors propose and support a hypothesis that such placebo effect is at least partially responsible for the beneficial effects of exercise. Instead of negating exercise as a valid clinical intervention, the study proposes consciously administering it as a placebo, in an ethical manner.

The possibility of such a placebo effect was also noted during the interviews in the current project. After reviewing the audio-tapes of the interviews, an undergraduate research assistant, who was a Senior psychology major, wrote the following, "The Yoga students were much more enthusiastic in answering the questions. . . but it seemed to me that they were just going along with the whole philosophy of Yoga. I am by no means under-estimating the effects of Yoga. [However] it often seemed as though they were saying what they had heard Yoga was supposed to do for them, when in actuality that may not have been their experience."

By suggesting that both exercise and Yoga induce a placebo effect, the present discussion does not intend to diminish their positive qualities. Indeed, other empirically based therapies also operate on the method of shifting the clients' set of expectations. For example, Bandura (1977) described the concept of "self-efficacy" which defined the clients' idea of own competence in difficult situations. Similarly, Beck (1991) focused on the clients' implicit set of expectations, or their "attitudes." According to Beck, a person's attitude becomes dysfunctional when it prevents the person from acting in a socially adaptable, adjusted manner. Such theories lay a foundation for the current school of cognitive therapy, which direct a clinician to clarify, challenge and modify the client's implicitly held expectations. Cognitive therapy has been proven to benefit clients suffering of clinical depression (Beck, 1991), anxiety (Beck, Emery & Greenberg, 1985) and addictive behaviors (Marlatt & Gordon, 1985).

However, in contrast to the process of cognitive therapy, the expectations induced through the process of exercise and Yoga may be insufficient for affecting a change in

such disorders as anxiety or depression. The model drawn on the basis of the current studies argues that physical activity, most likely, benefits people by raising their physical self-concept. A person may adapt a more positive view of own physical abilities, health and level of energy. In cognitive terms, a person's level of self-efficacy may rise as a result of practicing Yoga or exercise on a regular basis. Nonetheless, the data in the present and past studies have shown no definite evidence that a person's experience of anxiety or depression may be alleviated by engaging in physical activity. Furthermore, some initial empirical data in the present study suggested that the group of students, who selected their Yoga class explicitly to manage stress, also appeared to become more psychologically distressed toward the end of the semester.

Based on such data, it is possible to make two separate clinical recommendations. First, physical exercise and Yoga may be recommended as an adjunct for traditional methods of therapy. Regular physical activity may especially benefit clients who hold unrealistically lowered expectations of their physical or intellectual abilities and, consequently, suffer of low self-esteem or mild dysthymia. From the current data and from previous research, it seems that Yoga and traditional exercise are equally beneficial in such cases. According to a personal attitude toward learning and emotions and according to their extrovert or introvert personality style, an individual may prefer one form of activity to another. Some clients may feel engaged by the Yoga philosophy and discipline, and others may benefit from the opportunity to experience pleasure, while playing sports. Second, a caution must be offered against recommending Yoga as a replacement for psychotherapy. By engaging in Yoga, a person may adapt expectations

of being able to influence own physical and emotional experiences. In case of clinical depression or anxiety, such expectations may be unrealistic and, possibly, lead to disappointment and further exacerbation of symptoms.

G. Further Research

The current project suggests at least two alternative directions for further research. First, it might be useful to test the proposed model of an interaction between expectations, stress and self-concept, as people engage in regular physical activity. Using an experimental design, a study may operationally define and, then, selectively modify each of the variables. Such a study may employ separate procedures to induce specific expectations, raise or lower stress and, possibly, temporarily influence a subject's self-perception. A similar study has been reviewed earlier, which tested the moderating effect of riding a stationary exercise bicycle on students' experience of waiting to be filmed by a TV crew (Otto, 1990). Although some researchers challenged the ability of such academic studies to translate into real-life situations (Agnew & Levin, 1986), an experimental approach would provide data for verifying the theoretical model and, possibly, even drawing causal connections. Second, it seems important to continue the research on the capacity and limitations of Yoga. As the popularity of Hatha Yoga continues to rise, it seems important to clarify its benefits and, at the same time, determine the limits of its effectiveness. The current project examined the effectiveness of a college course which met twice a week for approximately one hour. By attending a

professional Yoga center, a person may have a radically different experience. There, camaraderie of like-minded individuals, exchange of information and opportunities to create positive interpersonal experiences may provide the "universal variables" generally characterizing a therapeutic environment (Yalom, 1985). It is likely that the experience of practicing Yoga in a special center has a greater therapeutic impact than the process of attending a class at a state university. A new study could use a quasi-experimental design to examine the efficacy of regular attendance at professional Yoga centers and, also, clarify the limitations of such practice.

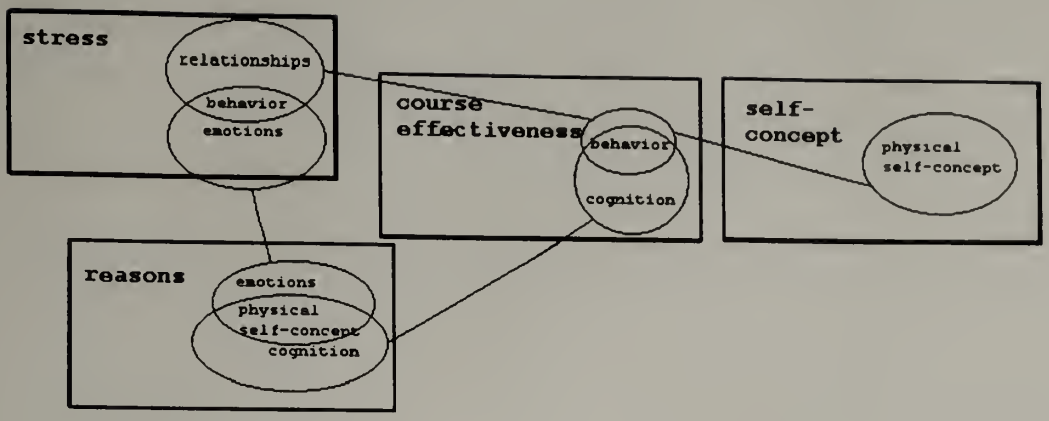

Figure 10.1. Final Model of Relationship between the Four Topic Areas: Stress, Reasons, Course Effectiveness and Physical Self-Concept

APPENDIX A

GENERAL HEALTH QUESTIONNAIRE

The questions below ask about **your physical health**:

15. In the last two weeks, did you have difficulties with any of the following:

15.a Allergies (allergic reaction to medication, injection or insect bite) Yes / No

15.b Skin (persistent or recurrent skin problem) Yes / No

15.c Ear/Eye (trouble with hearing; sinus-nasal or ear problems; problems with mouth, throat or larynx; poor vision not corrected by glasses or contact lenses) Yes / No

15.d. Dental Yes / No

15.e Respiratory (asthma; lung disease or breathing problems) Yes / No

15.f Circulatory (high blood pressure; rheumatic fever; heart murmur; heart attack or coronary; angina; hemophilia or bleeding disorder; sickle cell disease) Yes / No

15.g Digestive (stomach, bowel or liver problem) Yes / No

15.h Genito-Urinary (kidney, bladder or prostate problem; -males- a loss or damaged function of a testicle; -females- problem of ovary, breast, vagina, uterus, or menstrual cycle) Yes / No

15.i Nervous/Hormonal (diabetes; endocrine glands; nervous system; seizures or epilepsy; severe headaches) Yes / No

15.j Bone/Joint (arthritis or gout; problem with bones, joints or back) Yes / No

16. Do you feel that you have a problem with drugs or alcohol use? Yes / No

17. Do you feel that your current psychological functioning is interfering with your normal activity? Yes / No

18. Are you using counseling for any of your emotional concerns? Yes / No

19. Are you on a special diet? Yes / No

20. Do you take any medication (prescribed or non-prescribed) on a regular basis? Yes / No

21. In the last two weeks, have you been admitted to a hospital for any of these physical or emotional problems? Yes / No

APPENDIX B

PHYSICAL SELF-DESCRIPTION QUESTIONNAIRE (PSDQ)

PHYSICAL SELF-DESCRIPTION QUESTIONNAIRE

In the following pages you will be asked to think about yourself physically. For example, how good looking you are, how strong you are, how good you are at sports, whether you exercise regularly, whether you are physically coordinated, whether you get sick very often and so forth. Answer each sentence quickly as you feel now. Please do not leave any sentence blank.

When you are ready to begin, please read each sentence and decide your answer. There are six possible answers to each question, "true," "false," and four answers in between. Before you start, there are three examples below. I have already answered two of the three sentences to show you how to do it. In the third one you must choose your own answer and circle it (○).

	False	Mostly False	More False Than True	More True Than False	Mostly True	True
1. I like to play tennis	1	2	3	4	5	(6)

(I put a circle around the number 6 under the answer "TRUE." This means that I really like to play tennis. If I did not like tennis very much, I would have answered 1 ("FALSE") or 2 ("MOSTLY FALSE")).

2. In general, I am very athletic	1	2	(3)	4	5	6

(I answered "MORE FALSE THAN TRUE" because I am definitely not an outstanding athlete, but I am not really out of shape either).

3. I like to go jogging	1	2	3	4	5	6

(For this sentence, you have to choose the answer that is best for you. First you must decide if the sentence is "TRUE" or "FALSE" for you, or somewhere in between. If you really like to jog a lot you would answer "TRUE" by putting a circle around the last number (6). If you hate running, you would answer "FALSE" by circling the first number (1). If you do not like jogging very much but you go running sometimes, you might decide to circle 2 ("MOSTLY FALSE") or 3 ("MORE FALSE THAN TRUE")).

If you want to change an answer you have marked you should cross out the circle and put a new circle around another number on the same line. For all sentences be sure that your circle is on the same line as the sentence you are answering. You should have only one answer circled for each sentence. Do not leave out any sentences, even if you are not sure which number to circle.

	False	Mostly False	More False Than True	More True Than False	Mostly True	True
1. When I get sick I feel so bad that I cannot even get out of bed.	1	2	3	4	5	6
2. I feel confident when doing coordinated movements.	1	2	3	4	5	6
3. Several times a week I exercise or play hard enough to breath hard (to huff and puff).	1	2	3	4	5	6
4. I am too fat.	1	2	3	4	5	6
5. Other people think I am good at sports.	1	2	3	4	5	6
6. I am satisfied with the kind of person I am physically.	1	2	3	4	5	6
7. I am attractive for my age.	1	2	3	4	5	6
8. I am a physically strong person.	1	2	3	4	5	6
9. I am quite good at bending, twisting and turning my body.	1	2	3	4	5	6
10. I can run a long way without stopping.	1	2	3	4	5	6
11. Overall, most things I do turn out well.	1	2	3	4	5	6
12. I usually catch whatever illness (flu, virus, cold, etc.) is going around.	1	2	3	4	5	6
13. Controlling movements of my body comes easily to me.	1	2	3	4	5	6
14. I often do exercise or activities that make me breath hard.	1	2	3	4	5	6
15. My waist is too large.	1	2	3	4	5	6
16. I am good at most sports.	1	2	3	4	5	6
17. Physically, I am happy with myself.	1	2	3	4	5	6
18. I have a nice looking face.	1	2	3	4	5	6
19. I have a lot of power in my body.	1	2	3	4	5	6
20. My body is flexible.	1	2	3	4	5	6

APPENDIX C

HASSLES AND UPLIFTS SCALE

Some of the items on this form may seem irrelevant to your current life situation. Please mark them as "not applicable" and answer the others.

HASSLES are irritants -- things that annoy or bother you; they can make you upset or angry. UPLIFTS are events that make you feel good; they make you joyful, glad, or satisfied. Some hassles and uplifts occur on a fairly regular basis and others are relatively rare. Some have only a slight effect, others have a strong effect.

The questionnaire lists things that can be hassles and uplifts in day-to-day life. You will find that during the course of a day some of these things will have been only a hassle for you and some will have been only an uplift. Others will have been both a hassle AND an uplift.

DIRECTIONS: Please think about how much of a hassle and how much of an uplift each item was for you this week. Please indicate on the left-hand side of the page (under "HASSLES") how much of a hassle the item was by circling the appropriate number. Then indicate on the right-hand side of the page (under "UPLIFTS") how much of an uplift it was for you by circling the appropriate number.

Remember, circle one number on the left-hand side of the page and one number on the right-hand side of the page for each item.

HASSLES AND UPLIFTS

How much of a hassle was this item for you this week. HASSLES 0 = None or not applicable 1 = Somewhat 2 = Quite a bit 3 = A great deal		How much of an uplift was this item for you this week. UPLIFTS 0 = None or not applicable 1 = Somewhat 2 = Quite a bit 3 = A great deal
0 1 2 3	1. Your child(ren)	0 1 2 3
0 1 2 3	2. Your parents or parents-in-law	0 1 2 3
0 1 2 3	3. Other relative(s)	0 1 2 3
0 1 2 3	4. Your spouse	0 1 2 3
0 1 2 3	5. Time spent with family	0 1 2 3
0 1 2 3	6. Health or well-being of a family member	0 1 2 3
0 1 2 3	7. Sex	0 1 2 3
0 1 2 3	8. Intimacy	0 1 2 3
0 1 2 3	9. Family-related obligations	0 1 2 3
0 1 2 3	10. Your friends	0 1 2 3
0 1 2 3	11. Fellow workers	0 1 2 3
0 1 2 3	12. Clients, customers, patients, etc.	0 1 2 3
0 1 2 3	13. Your supervisor or employer	0 1 2 3
0 1 2 3	14. The nature of your work	0 1 2 3
0 1 2 3	15. Your work load	0 1 2 3
0 1 2 3	16. Your job security	0 1 2 3
0 1 2 3	17. Meeting deadlines or goals on the job	0 1 2 3
0 1 2 3	18. Enough money for necessities (e.g., food, clothing, housing, health care, taxes, insurance)	0 1 2 3
0 1 2 3	19. Enough money for education	

APPENDIX D

PENN STATE WORRY SCALE

Use the following scale to indicate how typical each item is of you:

		Not at all typical		Somewhat typical		Very typical
1.	If I do not have enough time to do everything, I do not worry about it	1	2	3	4	5
2.	My worries overwhelm me	1	2	3	4	5
3.	I do not tend to worry about things	1	2	3	4	5
4.	Many situations make me worry	1	2	3	4	5
5.	I know I should not worry about things, but I just cannot help it	1	2	3	4	5
6.	When I am under pressure, I worry a lot	1	2	3	4	5
7.	I am always worrying about something	1	2	3	4	5
8.	I find it easy to dismiss worrisome thoughts	1	2	3	4	5
9.	As soon as I finish one task, I start to worry about everything else I have to do	1	2	3	4	5
10.	I never worry about anything	1	2	3	4	5
11.	When there is nothing more I can do about a concern, I don't worry about it anymore	1	2	3	4	5
12.	I have been a worrier all my life	1	2	3	4	5
13.	I notice that I have been worrying about things	1	2	3	4	5
14.	Once I start worrying, I cannot stop	1	2	3	4	5
15.	I worry all the time	1	2	3	4	5
16.	I worry about projects until they are all done	1	2	3	4	5

APPENDIX E

ROSENBERG SELF-ESTEEM SCALE

Below is a list of statements dealing with your general feelings about yourself. If you AGREE with the statement, CIRCLE A. If you STRONGLY AGREE, CIRCLE SA. If you DISAGREE, CIRCLE D. If you STRONGLY DISAGREE, CIRCLE SD.

		1 Strongly Agree	2 Agree	3 Disagree	4 Strongly Disagree
(1)	On the whole, I am satisfied with myself.	SA	A	D	SD
(2)	At times I think I am no good at all.	SA	A	D	SD
(3)	I feel that I have a number of good qualities.	SA	A	D	SD
(4)	I am able to do things as well as most other people.	SA	A	D	SD
(5)	I feel I do not have much to be proud of.	SA	A	D	SD
(6)	I certainly feel useless at times.	SA	A	D	SD
(7)	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
(8)	I wish I could have more respect for myself.	SA	A	D	SD
(9)	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
(10)	I take a positive attitude toward myself.	SA	A	D	SD

SYMPTOM CHECK LIST-90, REVISED (SCL-90R)

INSTRUCTIONS:

Below is a list of problems people sometimes have. Please read each one carefully, and blacken the circle that best describes HOW MUCH THAT PROBLEM HAS DISTRESSED OR BOTHERED YOU DURING THE PAST 7 DAYS INCLUDING TODAY. Blacken the circle for only one number for each problem and do not skip any items. If you change your mind, erase your first mark carefully. Read the example before beginning, and if you have any questions please ask about them.

EXAMPLE

NOT AT ALL	A LITTLE BIT	MODERATELY	QUITE A BIT	EXTREMELY	HOW MUCH WERE YOU DISTRESSED BY:
0	1	2	●	4	1. Bodyaches

NOT AT ALL	A LITTLE BIT	MODERATELY	QUITE A BIT	EXTREMELY	HOW MUCH WERE YOU DISTRESSED BY:
0	1	2	3	4	1. Headaches
0	1	2	3	4	2. Nervousness or shakiness inside
0	1	2	3	4	3. Repeated unpleasant thoughts that won't leave your mind
0	1	2	3	4	4. Faintness or dizziness
0	1	2	3	4	5. Loss of sexual interest or pleasure
0	1	2	3	4	6. Feeling critical of others
0	1	2	3	4	7. The idea that someone else can control your thoughts
0	1	2	3	4	8. Feeling others are to blame for most of your troubles
0	1	2	3	4	9. Trouble remembering things
0	1	2	3	4	10. Worried about sloppiness or carelessness
0	1	2	3	4	11. Feeling easily annoyed or irritated
0	1	2	3	4	12. Pains in heart or chest
0	1	2	3	4	13. Feeling afraid in open spaces or on the streets
0	1	2	3	4	14. Feeling low in energy or slowed down
0	1	2	3	4	15. Thoughts of ending your life
0	1	2	3	4	16. Hearing voices that other people do not hear
0	1	2	3	4	17. Trembling
0	1	2	3	4	18. Feeling that most people cannot be trusted
0	1	2	3	4	19. Poor appetite
0	1	2	3	4	20. Crying easily
0	1	2	3	4	21. Feeling shy or uneasy with the opposite sex
0	1	2	3	4	22. Feelings of being trapped or caught
0	1	2	3	4	23. Suddenly scared for no reason
0	1	2	3	4	24. Temper outbursts that you could not control
0	1	2	3	4	25. Feeling afraid to go out of your house alone
0	1	2	3	4	26. Blaming yourself for things
0	1	2	3	4	27. Pains in lower back
0	1	2	3	4	28. Feeling blocked in getting things done
0	1	2	3	4	29. Feeling lonely
0	1	2	3	4	30. Feeling blue

APPENDIX G

ATTITUDE SCALE

During the course of the semester, I attended this P.E. class _____
(for example, "swimming," "Yoga II" or "none").

The questions below ask about the **overall importance** of this course:

	Not At All	Very Unlikely	Unlikely	Possibly	Very Likely	Definitely
1. I expect to practice the skills that I learn in this course in my spare time.	1	2	3	4	5	6
2. Taking this course will influence the length and structure of my usual exercise routine.	1	2	3	4	5	6
3. I intend to use the skills from this course to manage stressful situations in my life.	1	2	3	4	5	6
4. Taking this course will influence the way I spend my spare time.	1	2	3	4	5	6
5. By taking this course, I intend to improve my physical health.	1	2	3	4	5	6
6. This course will add a spiritual dimension to my life.	1	2	3	4	5	6
7. The skills that I learn in this course will help me feel better psychologically.	1	2	3	4	5	6
8. Of all the courses this semester, this is the most important one.	1	2	3	4	5	6
9. The course instructor was very effective in presenting information.	1	2	3	4	5	6
10. Besides the time spent in this class, I work out regularly.	1	2	3	4	5	6
11. I have had extensive experience with the skills taught in this course, even before this semester.	1	2	3	4	5	6
12. The course instructor was influential in changing my perception of myself.	1	2	3	4	5	6

13. My age: _____

14. The main reason I signed up for this course is:

APPENDIX H

OUTLINE OF THE STRUCTURED INTERVIEWS

Reasons and Expectations

- I.1. why did you sign up for this course?

- I.2. what did you want to change about your life?
probe:
  - I.2.a. how would you know if these changes occurred? (quote the changes)
  - I.2.b. who would be the first person to notice the changes? (again, quote)
  - I.2.c. what would that person see different about you?
  - I.2.d. did any of these reasons apply to you: (very much. . . not at all)
    - i. manage stress and relax
    - ii. improve physical health
    - iii. improve body image
    - iv. answer questions about life in general (spirituality, etc)
    - v. learn something new
    - vi. have fun
    - vii. earn an easy credit, convenient for the schedule, etc.

- I.3. has the course helped you to achieve the original goals? (quote)
probe:
  - I.3.a. what recent events in your life make you think that you have achieved some of these goals?
  - I.3.b. how do you think the course helped?
  - I.3.c. how did the course compare with your expectations? in what ways did it surpass them? fall short?

- I.4. some literature suggests that Yoga raises the awareness of your emotions and physical sensations. do you think that this is true?
probe:
  - I.4.a. how can you tell in your life?
  - I.4.b. do you think that being more aware makes you feel better or worse?

Perception and Management of Stress

- II.1. are there times when you feel stressed?
probe:
  - II.I.a. how can people around you tell that you are stressed?
  - II.1.b. what specifically do you feel about stressed about today?
  - II.I.c. how do stressful events in your life, besides school, compare with the stress of being at U Mass?
  - II.I.d. are there times during the course of the semester that you feel the more stress than at other times?
  - II.1.e. how can you tell?

- II.2. what do you do to cope with stress?
probe:

II.2.a. how often do you find yourself using these strategies? (quote)
II.2.b. when do they work the best?
II.2.c. if they do not work, what else can you do?

- II.3. in what ways, if any, did taking the course help you managing your stress?
probe:

II.3.a. how can you tell if the course is effective in helping you to manage stress?
II.3.b. how can people around you tell?

- II.4. a study last semester suggested that students are more stressed at the end of the semester. why do you think this may be true?

- II.5. a study last semester also suggested that Yoga students feel more stressed than the exercise students. why do you think this may be true?

Self-Concept and Physical Activity

- III.1. do you think that you feel differently about yourself now than at the beginning of the semester
probe:

III.1.a. how do you think you changed physically?
III.1.b. in what situations do you notice the change?
III.1.c. how can people who are close to you tell the difference?
III.I.d. what happened during the semester to make that change?
III.I.e. how do you think you changed emotionally?
III.1.f. in what situations do you notice the change?
III.1.g. how can your close friends tell?
III.1.h. what happened during the semester to make that change?

- III.2. do you think that this course made a difference in the way you feel about yourself?
probe:

III.2.a. what about this course that may have helped this change?
III.2.b. what situations make you notice this change?
III.2.c. how did the course help you change the way you feel about your physical abilities (quote)
III.2.d. how did the course help you change change the way you feel emotionally (quote)

- III.3. literature talks about a connection between people's psychological and physical health. do you think it exists?
probe:

III.3.a. among people whom you know well, do you see evidence for connection between their physical health and their feelings?
III.3.b. do you believe that your own feelings are affected by your physical health?
III.3.c. can you give a few recent examples?

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